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ABSTRACT

Although workplace requirements are mandating that employees possess higher-order skills, an alarming proportion of young Canadians are dropping out of secondary school before acquiring the skills they need to survive in a super-symbolic economy. Dropout prevention programs can curtail these trends and the effectiveness of one such program, the Cognitive Based Instructional System (CBIS), is described in this document. Quantitative and qualitative results of the program are discussed. Teachers can successfully provide cognitive augmentation and transfer training to individual students and can infuse it into the classroom context; however, they should have a reduced workload. Follow-up studies of students indicated reduced dropout rates and improved school performance. CBIS is an important "learning how to learn" strategy that empowers at-risk students to cope with information processing demands. Conditions for the successful implementation of CBIS program are reviewed and 20 recommendations for future implementation are made. Appendices included are: (a) Summary Tables for statistical Analysis; (b) CBIS Debriefing Questionnaires; and (c) Sustainability of CBIS. (EMK)

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ED 418 348

DROPOUT PREVENTION THROUGH A COGNITIVE BASED INSTRUCTIONAL SYSTEM

Why Are We Not All Born Smart?

FINAL REPORT

A Demonstration Project
Funded by

Human Resources Development Canada
and
Supported by the Faculty of Education
University of Manitoba
In Partnership with
Fort Garry School Division
St. Boniface School Division
and
Winnipeg School Division

1995

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Funded by

Human Resources Development Canada
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Program Director: Richard Coutts

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Fort Garry School Division
Acadia Junior High School &
Arthur A. Leach Junior High School

St. Boniface School Division
École Lacerte

and

Winnipeg School Division
General Wolfe School

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University of Manitoba
July, 1995

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and

ALL PARTICIPATING STUDENTS AND THEIR PARENTS

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CBIS Project Staff

August 1995.

PREFACE

There are 3.7 million young people between the age of 15 and 24 in Canada- about 14 percent of the population. In 1993, there were approximately 420,000 young people in any given month who were unemployed and actively looking for work. This represents an unemployment rate of almost 18% for those 15 to 24 years of age. In 1992, youth constituted 16.6% of Unemployment Insurance (UI) recipients and received approximately $2.5 billion in benefits. Canadian youth also received more than $2 billion in social assistance in 1992. Youth currently represents 21% of all social assistance cases. Further analysis of youth unemployment data indicates that almost half of the youth not in school or the labour force are single women with children. Poverty among young Canadians remains a serious social problem: over half of single people under the age of 25 lived in low income circumstances in 1992. While 420,000 young Canadians are unemployed, there are approximately 600,000 jobs that are not filled because employers cannot find employees with adequate skills (Human Resources development Canada, 1994).

Too many young Canadians are also dropping out of school without the critical skills necessary to obtain good jobs in a super-symbolic economy. Owen (1995) noted "the changing labor market is hardest on those at the bottom of the skills distribution hierarchy and that good jobs for 'strong backs and weak minds' are becoming scarce" (p. 7). According to Toffler & Toffler (1995) the only effective strategy for reducing joblessness in a super-symbolic economy must depend less on the allocation of wealth and more on the allocation of knowledge. This project focused on the empowerment of at-risk students by augmenting their cognitive controls and enhancing their learning skills. They were taught "learning how to learn" skills to encourage

them to stay in school and acquire the critical skills they need to allow them to improve their own conditions and contribute to the economic prosperity of the nation.

This report has been subtitled after the input obtained from a student, during the debriefing interview. The students' comments highlighted the dilemma of human condition which necessitates projects like CBIS and all the work it involves: **Why Are We Not All Born Smart ?**. This subtitle reflects the everyday frustration faced by many school children who cannot cope with the information processing demand imposed upon them by school learning. It calls attention to the urgent needs for empowering these children so that they can survive and succeed in a super-symbolic environment. CBIS brings some hope to these children. Since this report is about these students and their teachers, we have included some of their reactions to the CBIS program in this preface to give some vivid examples of their experiences with the CBIS program.

Teachers' Comments

- "Never have I felt so sure that some of the decisions I am making are sound and valid, and with all my educational training I was never, before this time in my career, able to say that with as much confidence."
- "I feel completely revitalized and at the same time drained."
- "I find this pilot almost all consuming in my thoughts . . . I really think this program could open doors for the kids. Finally a logical, sequential approach!"
- "This was the most valuable thing I have ever done in my fifteen years of teaching. It was trying at times, but worth it."

- "I hold a pre-master's in educational psychology and I have taken part in numerous summer institutes, but I have learned more from this than from any previous course."
- "This is a very valuable tool."
- "The program is great, excellent. I will continue using it in my classes."
- "This dramatically changed my teaching style and my ability to interact with students who experience difficulties. It was the most valuable professional development experience ever."
- "I now know more about why some kids are weak."
- "The program has enlarged my awareness of the areas where kids have problems. I learned different strategies to cope with these problems. I have adjusted my teaching to facilitate better learning."
- "I have learned to pay more attention to cognitive processing."
- "Our schools are too much involved in making kids just feel good. This program finally centered on learning, on how to help a child realize his capacity to learn."
- "This is a very viable concept. I am pleased and excited to have been part of it."
- "This is encompassing teaching and its applications to classroom teaching are really powerful."
- "When the lights go on in (the students') eyes because they suddenly made sense out of something that was previously nonsense, it makes all the effort worthwhile. I am convinced, and pray with all my heart that stats prove it true that this program can work."

- "This pilot project represents a new opportunity to help students and gives teachers a new tool to help educate."
- "I asked him to memorize the poem. He said he could not. I told him I would show him a way. I developed mnemonics for him. He did state the poem from memory!!! What a breakthrough."
- "I am struck by how much assumption there is in teaching how, global we are in our content, and how little time or consideration is given to the student and what we are asking them to do."
- "Upon now realizing the variation in students' ability to analyse, and the importance of this cognitive skill in learning, I find myself rethinking how I issue notes and model example questions. I realize the need for specificity and for clear illustration."
- "One thing about CBIS that impressed me the most was how it made me see things through a different "window". This seems to be hard to explain unless you've done it, but it really helps to see things:

  a) from a student's perspective.

  b) not to take for granted that students understand everything they read - even though they may say they do."
- "In my regular classes I have begun implementing idea trees (networks). I constructed the framework for the idea tree and then had students read a unit, then fill in the empty cells. Two days later, without having asked the students to study the tree or refer back to it I informally quizzed them on reconstructing it. It was significant, the amount of

detail put back into the tree, and their ease for recalling this information was impressive."

- "If I were to go back to a regular classroom, I'll never be able to teach the same way again. I will be better able to reach more children."
- "If this program were to be offered again, or as a continuing program, I would definitely get involved. I believe in it-it works!"
- "You can't assume kids have a certain knowledge. I teach more carefully, more systematically and I go at a pace that is reasonable and sensible." And "I now engineer for the cognitive skills and I do a cognitive analysis before I develop content."
- "I look at the task students are asked to do and then I break down the curriculum in such a way that they'll understand."
- "Next year I'll bring the cognitive skills approach right at the beginning of the year."
- "I am sold on CBIS."
- "I'll start each future course by teaching how to process information."
- "They are not as negative as they used to be."
- "They have become less impulsive, less ready to throw up their hands and give up on the assignment."
- "They have better attitude and show better behaviour."
- "They are more able to do the work."
- "They have learned to tackle problem one step at a time and they have cut down on the natural impulsiveness."
- "They just seem happier."

- "They're happier now, more enthused, less fatalistic."
- "They are more concerned about academics now and they'll come back and ask for assistance."
- "Kids are doing better and me too."
- "It made me like my job better and I really got to know the students well."
- "Students learned and I learned."
- "It opened up new strategies for me and changed certain things in the way I am teaching."
- "It gave me a new perspective on how students learn and how they process information."
- "It gave students new tools to learn."
- "It enriched me professionally."
- "I acquired new expertise which gave me confidence and a better understanding of the learning process."
- "I have learned to identify quickly the students with learning difficulties."
- "I learned patience and how to pace myself when working with children."
- "Once you have these skills, your performance in academics and in life in general will be positively affected."
- "It was rewarding to see a student gain confidence and change his attitude towards academics."
- "It works! It is fascinating!"

Students' Comments

- "It helped me to learn better."
- "It was good because you had to work really hard."

- "The teacher explains things for you; he corrects; he helps."
- "You develop a better relationship with your teacher."
- "The teacher pays more attention to you."
- "The teacher watches me work and he explains where I went wrong."
- "I understand better than in the big class."
- "Difficult subjects, like maths, became easier."
- "You can concentrate more. There were not so many people around. I loved it."
- "In the large class a teacher has difficulty in paying attention to individual students."
- "It helped, because it broke the work up in fragments."
- "The teacher helped me with my regular subjects."
- "Little-by-little it is easier to learn."
- "Before I could not care less, I felt unwanted. After this I am tempted to work. I feel much smarter.
- "Project made things easier. I am feeling a new man."
- "It helped me learn better. I understand more than in the big class."
- "I was always told I am stupid. The group told me I was smart."

EXECUTIVE SUMMARY

As we move into an internationalized information-based economy, a well-educated workforce is becoming the key ingredient for maintaining our competitiveness as a nation. While workplace requirements are calling for employees with higher order skills, an alarming proportion of young Canadians are dropping out of secondary school before acquiring the critical skills they need to survive in a super-symbolic economy. It is estimated that 30 to 35% of young Canadians are not completing secondary school. The purpose of this project was to assess the effectiveness of the Cognitive Based Instructional System (CBIS) as a dropout prevention strategy for those students who leave school because they cannot cope with the information processing demand imposed upon them by school learning.

Eleven teachers from four junior high schools were trained in the cognitive augmentation and transfer strategies. These teachers tested the cognitive controls of a selected group of students on seven dimensions, namely: analytical, focus, reflective, narrow, complex, sharpener and tolerance using the Cognitive Profile Assessment Instrument of Dr. Charles Letteri. The test results were used to identify the cognitive profile of these students as Type 1, 2 and 3. Forty-four students having a cognitive profile of Type 2 or Type 3 were selected as test subjects for this project. The Dropout Prediction Scale, the Culture Free Self-esteem Test, the School Attitude Measure and the Canadian Test of Basic Skills in math and reading were also administered as pre and postests.

Each participating teacher was assigned to 4/5 students. Using CBIS methodology and materials, the teachers provided approximately 20 hours of cognitive augmentation and transfer

training in the seven cognitive controls to their students. Both quantitative and qualitative data were collected and analysed.

Results showed that 38 per cent of the CBIS students experienced important improvement in the overall cognitive profile type. Analysis of the overall cognitive profile change revealed a 20 per cent movement from Type 2 to 1, 2 per cent from Type 3 to 1 and 16 per cent from Type 3 to 2. Additionally, there were also important gains on the seven cognitive controls, as many students moved from Type 3 to 1, Type 2 to 1 and Type 3 to 2.

The quantitative results showed no statistically significant differences in students' potential for dropping out of school, academic performance, attitude and self-esteem. However, the qualitative results indicated important gain in academic achievement, attitude toward school, self-esteem and behaviour.

Results of debriefing interviews indicated that all participating teachers believed that the CBIS is an important tool for empowering students to succeed and stay in schools. Teachers felt ill-equipped to deal with students with cognitive skill deficits and they all believe the CBIS provides a theoretical and practical framework for making systematic decision for helping these students. This belief is exemplified in teachers' comments such as this: "Never have I felt so sure that some of the decisions I am making are sound and valid, and with all my educational training I was never, before this time in my career, able to say that with as much confidence." Many teachers also felt that CBIS helped them to change their beliefs about teaching and learning in important ways: "I am struck by how much assumption there is in teaching, how global we are in our content, and how little time or consideration is given to the student and what we are asking them to do."

These teachers can successfully provide cognitive augmentation and transfer training to students. They can also infuse cognitive augmentation training into the whole classroom context. However, because of their workload teachers found it extremely difficult to be a regular classroom teacher and a clinician at the same time. Teachers engaged in CBIS training should have a reduced workload.

Students also felt empowered by the CBIS training: "It helped me to learn better." "Difficult subjects, such as math, become easier." "Before I could not care less, I felt unwanted. After this I am tempted to work. I feel much more smarter. I was always told that I am stupid. The group told me I was smart."

Follow-up of the students involved in this project, two and a half years later, indicated that only 9.9 per cent of the students had dropped out of schools. Additionally, it was found that the majority of these students were not experiencing academic difficulties, had no behaviour problems and had a positive attitude toward school.

The conclusion drawn was that CBIS is an important "learning how to learn" strategy for empowering at-risk students to cope with information processing demand imposed upon them by school learning. However, further research is necessary to determine the relative importance of the seven cognitive controls, the sequence in which augmentation training should be provided on the seven cognitive controls, the amount of training required to produce cognitive profile change and improvement in academic achievement. CBIS program should be implemented at the elementary school as many students involved in this project failed to meet school readiness criteria when they were initially admitted in kindergarten.

DROPOUT PREVENTION THROUGH A COGNITIVE BASED INSTRUCTIONAL SYSTEM

Introduction

As we move into a super-symbolic, internationalized information-based economy, a well-educated workforce is becoming the key factor for maintaining our competitiveness as a nation. While workplace requirements are calling for employees with higher order skills, it appears that widespread illiteracy prevails and an alarming proportion of young Canadians are dropping out of secondary school before graduation. It is estimated that 30 to 35% of young Canadians are not completing secondary school. However, according to a survey conducted for Human Resources and Labour Canada (1993) only 18% of 20-year-old Canadians had not completed high school. The high school dropout rate for Manitoba is at an all time high of 27.6% (Maclean's, January 11, 1993). According to the recent report released by the Manitoba Skills Training Advisory Committee (1990) approximately 45% of the Manitoban labour force has not completed a high school education.

High school dropout appears to have important implications for the Canadian society. The Steering Group on Prosperity (1992) notes that the alarmingly high dropout rate makes Canadians wonder whether we are being adequately prepared "for a world in which we must rely more on our brains than on brawn to innovate and compete" (p. 35). The Conference Board of Canada (1992) estimates that Canadian society will lose more than $4 billion over the lifetime of the 137,000 students who dropped out of school in 1989. The Conference Board also estimates

that each young male and female dropping out of school will respectively lose $129,000 and $107,000 over their working life. Additionally, the unemployment rate is higher among high school dropouts; they can expect to earn less than those who graduate (Weber, 1987), and are more likely to be laid off first in times of economic recessions (Statistic Canada, 1986). Furthermore, students dropping out of high school tend to have more health problems, are more dissatisfied with their personal life, and are more often involved in problems of truancy, violence, alcohol and drug abuse, and teenage pregnancy than the high school completers. It has also been suggested that high school dropouts tend to be a self-perpetuating phenomenon, as students who drop out of school have parents who also dropped out (Weber, 1987).

Closely associated with high school dropout is the problem of illiteracy. Empirical evidence suggests that the basic literacy skills of high school dropouts are significantly lower that those of high school completers (Rock et al., 1985). Functional illiteracy has become a problem of national concern. Clamp (1990) argues that "illiteracy has defied the concerted efforts of decades of public funding and human resources, not to mention over a century of free and universal elementary schooling" (p. 22). The recent Southam Literacy Survey (Creative Research Group, 1987) indicates that approximately one out of every four Canadians over the age of 18 is illiterate.

A recent survey conducted by the Conference Board of Canada (Des Lauriers, 1989) indicates that between 31 and 38 percent of the organizations surveyed identified illiteracy as being a major problem for introducing new technology and workplace training programs. Additionally, 41 percent of these organizations attributed errors in input and processes to deficiencies in basic skills. Deficiencies in literacy and numeracy skills were also associated

with productivity problems (30%) and problems in product quality (27%). Results of a survey released by the Canadian Labour Market and Productivity Centre (1990) revealed that illiteracy was linked with low productivity (46%), poor product quality (42%) and increased training cost (42%). It is estimated that each year illiteracy costs the Canadian society and Canadian business $10 and $4 billion respectively.

Problem

High school dropout represents a waste in human and has serious economic and social consequences. Conference Board of Canada (1992) notes that due to the "demographic shortages, the growing competition from the academic systems of competitor nations, and the rising skill requirements for new and existing jobs, a continued national dropout rate of 30 per cent or more will have an increasingly negative impact on Canada's economic future" (p.4). Morris, Pawlovich and McCall (1991) also argue that "changes in the labour market demand that young people complete secondary school as a minimum preparation for the technological world of tomorrow" (p. 8). Too many young Canadians are dropping out of school at a time when workplace requirements are calling for a more educated workforce. Employment and Immigration Canada indicates that 64.5 per cent of all new jobs that will be created between 1990 and the year 2000, will require a minimum of 12 years of education or training. Morris et al. (1991) argue that: "technological change, increased global economic competition and impending labour shortages are all forcing nations to retain more of their students and to prepare them adequately for a truly new world of work" (p. 6). Given this context, it is therefore imperative to implement appropriate strategies to retain students in high schools.

Research indicates that students drop out of school for a variety of reasons. Hargroves (1986) notes that dropping out of school is a "complex of interacting problems" and that it is a "final step in a long chain of events and processes" (p. 207). In this project we were primarily interested in students who were at-risk of dropping out because of their inability to cope with the information processing demands imposed upon them by school learning. A recent report released by the Prosperity Secretariat (1992, a) notes: "too often programs developed to intervene and service "at-risk" youth focus on the symptoms rather than the basic causes of dropping out. Researchers seldom distinguish between factors that cause dropping out from those correlated with dropping out. We must recognize that dropping out is part of a process, starting at the elementary level. Many of us get caught in a conventional trap and see dropping out as an outcome of schooling" (p. 34). The Prosperity Secretariat (1992, b) further notes: "research on drop-outs shows that, while in school, they are the most severely miss-matched student group in terms of the instructional and learning dynamics of the classroom" (p. 31) as a result these "students feel anxious and direct their energies to dealing with stress and frustration rather than learning" (p. 34). The Prosperity Secretariat also made the following recommendation to address high school dropout: "the curriculum . . . and the instructional approaches/strategies used (how students learn and teachers teach) should be revised and revitalized" (p.ii).

Students at risk present a unique problem for educators. Their learning difficulties are compounded by a forceful sense of rejection. The students feel rejected by the instructional program and in turn reject that program. A codependent need arises since the problem resides in both the program and the students. The **program**, because of its instructional organization, is

most concerned with establishing a manageable learning environment **(context)** in which structured curriculum **(content)** can be taught. The **program** problem exists because the organization is structured to support teaching as opposed to students' learning and performance. Because of specific cognitive deficits, students do not have the basic information processing skills **(cognition)** required for successful completion of academic learning and performance tasks. The **students'** problem exists because students are not equipped with the essential cognitive skills required by the instructional **program**. The students, teachers, programs and organizations involved must have an educational system designed to address their codependent needs. The Cognitive Based Instructional System is specifically designed to meet these needs. The purpose of this demonstration project was to assess the effectiveness of the Cognitive Based Instructional System designed as a dropout prevention strategy.

CONCEPTUAL FRAMEWORK

The At-Risk Student: A Cognitive Perspective

The "at-risk" student was operationally defined as that student whose academic and personal performance in school put him/her in danger of failure in academic learning and performance tasks. Simply stated, the "at-risk student" is at-risk of dropping out of the school system that is expressly designed for his/her benefit. How to diagnose and prevent this failure was the object of this proposal.

Cognitive-based research over the last 15 years has substantiated the use of the Cognitive Profile Assessment Instrument (CPAI) to measure a student's cognitive skills and to identify those students who are at-risk of failure or of becoming behavioral problems. The Cognitive

Control Profile consists of seven bi-polar measures of basic cognitive skills: Analytical; Focus; Reflective; Sharpener; Narrow; Complex; Tolerance. Following is a brief description of these seven controls along with the skills measured by each.

Analytical/Global

This dimension marks a tendency of a student to either experience items as part of a background (Global) or to overcome the influence of an embedded context and view items as separate from the background (Analytic). Basically, the analytic student can break down complex figures of information into components; establish appropriate relationships between the components; and make decisions related to further processing.

Analytic. An analytic student can break down complex tasks into component parts, name or label them and correctly categorize them and compare them to information in memory.

Global. The global student tends to view the given task as a whole and is incapable of sorting the individual items for the purpose of analysis or comparison. The global student lacks the capacity to recognize discrete items in a given task, items that may be essential to the identification of a solution. These students have difficulty in attacking many tasks or knowing how to proceed even when instructed. They may require frequent repetition of instructions related to the performance task. When a problem is too complex, they are confused and may select inappropriate solutions, or even rejection might result.

Focus/Non-Focus

This dimension describes an individual's extent and intensity of attention deployment to a given task. It measures the ability of a subject to attend to the specific elements of a task that are relevant to its identification and accurate solution construction. This dimension, in essence,

measures the degree and extent of the individual distractibility: whether there is a tendency to control attention selectively or whether there is a lack of control and hence a chaotic disorganized procedure of attention deployment in the given task. The test for this dimension does not require the use of memory since all the necessary information is visible and available to the student.

Focuser: The focuser, when instructed as to the importance of the specific attribute of a stimulus and provided with a constant standard for making comparison, is capable of selectively attending to that specific attribute and disregarding all irrelevant information. This leads to accurate identification of problems and selection of appropriate solutions or correct responses.

Non-Focuser: Even with specific instructions, the non-focuser cannot attend to the relevant attribute of a task and displays a high degree of distractibility. Non-focusers also often attend to irrelevant attributes in the problem. Additionally, if these irrelevant attributes are familiar, highly interesting, novel, or seen less complex and demanding than the relevant attributes, the non-focuser will attend to and utilize them (irrelevant attributes) in task identification and problem solving solution procedures. This leads to incorrect problem identification, inappropriate and inaccurate responding.

This inability to identify and attend to relevant attributes will demonstrate itself in math word problems, reading comprehension, spelling and difficulties in understanding instructions related to assigned problems.

Reflective/Impulsive

This dimension marks the consistency in the speed and accuracy with which an individual selects hypotheses and prosesses information relative to a comparative analysis task. This task does not require the use of memory since all information is visible to the subject at all

times. Comparative analysis is the skill required to select a correct response or problem solution from among highly similar but not identical alternatives. It also includes the skill required to perform a highly accurate and properly ordered comparison between two or more elements of information in order to determine the basis for similarities and differences.

***Reflective*:** The reflective student takes a sufficient amount of time to examine in great detail all aspects of the problem under investigation and generates various responses for making comparative analysis. This analysis process is highly organized, under direct control of the student. The reflective student has a known plan of attack and demonstrates a high degree of perseverance and purpose in all learning tasks. The accuracy of responses is of paramount importance. While the time required to complete a task appears to be of little importance to the reflective student.

***Impulsive*:** The impulsive student's main concern is response time. Any response is offered rapidly to satisfy this concern. Impulsive students approach most performance tasks in a disorganized fashion. Partial, incomplete and inaccurate analysis of a problem and its solutions are the marks of the impulsive. Impulsives have chaotic search patterns. They does not know how to organize for learning tasks, and exercise no control over the procedures employed. In many cases impulsives do not seem cognizant of the information that is visible and available. They seldom refer to the information presented when selecting the responses among the alternatives offered. Because impulsives have difficulty understanding or recognizing the problem they see no apparent relationship between the problem and possible solutions. As a result, the impulsive experiences severe difficulty in those learning tasks where a great amount of information is contained in the problem itself. In short, any learning task that requires careful

problem analysis, selection among multiple responses or the combined use of two or more data sources will pose difficulty for the impulsive student.

Narrow/Broad

This dimension marks a student's consistent preference for the degree of inclusiveness in establishing the acceptable and appropriate range of specific category parameters. It describes the structural organization of categories as a major element of cognitive control. In addition, it is a measure of organizational exactness, i.e. how carefully the details of categorized information are arranged.

Narrow: The narrow students have well defined, specific and definitive criteria to classify and categorize information. Due to their high degree of discernment there is no confusion concerning the actual task nor any vagueness or confusion concerning the similarity between new information and previously learned material. Hence, error rates in these areas are low. The narrow student maintains and utilizes discrete and detailed categories of information for problem solving and performance tasks. A response, therefore, will contain not only the correct category but will also be accompanied by detailed justification for category selection.

Broad: The broad student tends to use vague criteria to classify and categorize. If a task resembles previously learned material, the broad student will identifies it as being identical, resulting in incorrect identification of problem-type, adoption of inappropriate procedures, and the selection of incorrect responses. When learning new material the broad student tends to amass it with vaguely similar information and the newly learned information appears to be forgotten rather rapidly. Since the broad student does not make use of clear and specific criteria for category inclusion, new information learned is highly disorganized, and is not readily

available for use in tasks' performance. The broad student experiences considerable difficulties with the storage and retrieval of data from memory.

Complex/Simple

This dimension describes individual differences in the variety of highly organized, distinct and highly specific categories by which information is structured in memory, and the ability to use this information to examine new information from a variety of relevant perspectives. This cognitive control is concerned with the structure and relationships among all categories of information in long term memory and their use in academic learning and performance tasks.

Complex: These individuals have prior knowledge available in their cognitive structure (long-term memory) which is highly organized by conceptual frameworks that are combined with an integrated body of knowledge and theoretical principles. In short, this individual has access to data in a highly usable and functional organizational framework.

Simple: This individual has a strong tendency to have existing knowledge (cognitive structure) arranged in somewhat indiscriminate and unorganized categories that lack specific details. In addition, this person perseveres in the use of information even if it is incorrect and shows reluctance to change categories. In learning new information, the simple individual finds it much easier to place data in a few large and non-specific categories rather than consider carefully each item for specific category inclusion.

Sharpener - Leveler

This dimension describes reliable individual variations in the assimilation of information in memory. It measures the ability of an individual to organize memory images and relate these

images to represent information. It also measures a capability to maintain sequential information in proper order and sequence. This control represents the skill required to maintain distinctions between individual concepts and structures in order to avoid overlapping and confusion among them. Included are mnemonic systems used to structure and maintain information in clear, stable and accessible formats in long term memory.

***Sharpener*:** The sharpener students tend to experience ease in successfully completing tasks that require organizing sequential processing, or keeping track of information as it undergoes changes in a sequential process. Reading comprehension and rote memorization require this skill. Sharpeners can maintain memory information which is: distinct, clear, stable and veridical in nature. Consequently, they can represent learned information to a high degree of exactness and can easily recall and apply when solving problems.

***Levelers*:** The leveler students are usually confused when processing memory items having highly similar elements. They will not notice or realize that sequentially presented information is undergoing subtle but substantial change. A change in plot, time, character or even a scene in reading may go unnoticed. Hence, learning in these areas will be impaired. The leveler also experiences problems with tasks requiring long-term memory storage and retrieval.

Tolerance/Intolerant.

This cognitive dimension represents the skills required to engage and examine apparently ambiguous information for the purpose of modifying existing structures of information and of accommodating new information within these related structures. They are are also required in problem recognition, identification and solution construction. These skills are used to monitor, direct and control the flow of information from the perceptual registers (e.g., eye, ear) to

placement in relevant structures within Long Term Memory, and for later recall (or reconstruction) in learning, problem solving and related performance tasks.

Tolerant: The tolerant student is open to novel or ambiguous experiences or information. Ambiguity is not in any way discomforting to the tolerant student. When confronted with a problem which is not in keeping with prior experience, the tolerant student examines the problem and attempts to solve it. The novel or dissimilar problem may even prove to be quite attractive to the tolerant. When confronted with evidence that they are wrong, tolerant students willingly accept both the evidence and the correction or at the very least, demonstrate a willingness to examine both sides of the issue.

Intolerant: The intolerant students hold to current knowledge even when faced with information which demonstrates clearly that the current knowledge is inaccurate. They demonstrate a marked tendency to hold to their perceptions or perspectives. When faced with an ambiguous situation, intolerant students tend to perceive the reality of the situation which most closely resembles their previous understanding or expectations for that part of reality. Once the intolerant student "makes up her/his mind" it is difficult to change that mind set. If forced to accept the ambiguous information and behave or perform on the basis of that information, intolerant students might acquiesce. However, they will behave contrary to their concept of reality, and sooner or later, their performance will falter due to indecision and inappropriate responses. This characteristic results in hardships in school learning for the intolerant. If their initial perceptions are not accurate, appropriate or acceptable, it will be most difficult to affect a cognitive shift in perception.

These seven cognitive controls have been found to determine and predict with high accuracy (.05 or better) a student's level of success in academic learning and performance tasks. Each control can be assessed separately and the results used to generate the cognitive profile of the student. The Cognitive Profile divides the population into three large categories of students, called Cognitive Profile Types (Letteri, 1985).

Type One Profile: Type One students show evidence of strength in a majority (4 or more) of the seven cognitive controls. These students are always in the top 15-18% of the population in academic achievement. The Type One students are found to be academically superior to grade level peers in all areas of standardized and teacher-made tests. These students have an abundance of those cognitive skills required for success in academic learning and performance tasks. Although the profiles may demonstrate strength in any four controls, there are however, certain combinations of controls that are significantly related to high achievement in particular academic subjects.

Type Two Profile: These students do not demonstrate particular strengths or weaknesses in the controls included in the Cognitive Profile. Their profiles will demonstrate either a major portion of mediocre ability or high inconsistencies, ranging from a few strong skills through a few at mediocre level to a few in the weak range. These students seem to swing from success one day to failure the next, from success in one subject to failure in others. The mix of failure and success seems to change constantly. These students also manifest the "Monday morning syndrome" wherein they seem to come to school every Monday as if it was their first Monday. Type Two students comprise 60-70% of the population.

Some of these students also provide the most behavioral problems (more so than Type Three students). Research clearly identifies the school individual who is on detention,suspension or expulsion as well as the student who, at age 18 or 19, becomes a resident of correctional institutions as Type Two student.

On the whole, these students do not draw much attention. They do come to school, most of the time do their assignments, even complete their homework now and then. At the end of 12 years of schooling they leave the system "none the worse for wear."

Type Three Profile: These students demonstrate a major deficit (4 or more) in terms of the cognitive controls as indicated by their Cognitive Profiles. These students present severe learning problems and are several grade levels below their placement grade in all areas of standardized testing. Their class grades on teacher made tests are also in the failure range. These students have a long history of failure, and, as research indicates, no amount of assistance has been able to rectify the situation. Although most of these students have been identified since the earliest grades as having learning problems, they are still in special programs after several years of assistance. While these students comprise approximately 15-18% of the school population, they do, however, get most of the attention, especially from the school system.

Augmentation and Transfer Training

The learning problems of the Type Three student, and that of the Type Two student, are not related to the difficulty or complexity of the subject matter. These problems relate to their lack of specific cognitive skills (profiles) required by their assigned academic learning and performance tasks (Chinien, 1990; Letteri, 1988). Research conducted by Dr. Letteri indicates that placing Type Two and Three students in a Cognitive Augmentation program for a minimum

of 24 hours is likely to have dramatic and long lasting impact on grade level achievement, and performance in teacher made tests. Improvements average 2.5 grade levels across all areas of standardized testing, as high as 5 grade levels in mathematics and an average of one letter grade increase across all areas of the curriculum as measured by teacher made tests.

Research attempting to profile drop out prone students has identified the following indicators: (1) poor basic skills as shown in test scores well below average for their expected grade levels, (2) poor academic performance, (3) lack of interest in school work, (4) low self-esteem/self-concept, (5) frequent absence and tardiness, (6) delinquent behaviour, and (7) poor participation in extracurricular activities. Research indicates that students involved in the Cognitive Based Instructional Program demonstrate changes in attitudes toward school as indicated by improved attendance. They also have fewer behavior problems, are more frequently involved in school activities, and exhibit a more aggressive learning style (Letteri, 1979). These changes in attitude occur because the cognitive training enhances the students' self concept by increasing their sense of empowerment. Cognitive training helps them to develop specific skills that they can successfully apply to learning and performance tasks. Repeated failures in school result in students' low self-esteem, loss of "dignity and a feeling of powerlessness" (Fine & Rosenberg, 1983). The cognitive empowerment of these students through the CBIS is manifested in improved academic performance, enhanced sense of competence and improved self images.

Cognitive Based Instructional System.

The Cognitive Based Instructional System (CBIS) can be used to help Type Two and Type Three students to enhance their cognitive controls through **Augmentation And Transfer.**

The CBIS allows the teacher to analyse an academic task in order to determine the cognitive requirements for successful performance. These cognitive requirements are then matched to the cognitive profiles of the students and deficiencies are noted. Through the process of Augmentation the teacher can help the students to enhance their cognitive skills to match the cognitive requirements of that academic task. Once the students have acquired the required cognitive skills, the teacher will then help them to transfer these skills to the academic learning task.

The CBIS focuses on students' empowerment through learning skills enhancement. The aim is to provide students with the most basic transferable skills required for effective performance, i.e. the skill to analyze content and problems and to determine what is required for successful completion of associated tasks.

Project Objectives

The overall purpose of this project was to pilot test the Cognitive Based Instructional System (CBIS) as a dropout prevention strategy within the framework of the Stay in School Initiative. More specifically, the following project objectives were identified.

1. To design, develop and implement a program to help a selected group of teachers to use the Cognitive Based Instructional System as a dropout prevention intervention.
2. To familiarize teachers with the CBIS.
3. To enable teachers to use the Cognitive Profile instrument for assessing students' cognitive profile.

4. To enable teachers to design appropriate augmentation strategies for individual students in order to enhance their cognitive profile.

5. To enable teachers to help students transfer newly acquired cognitive skills to various academic tasks within the school curriculum.

6. To enable teachers to implement the cognitive profile augmentation strategy to the whole classroom context.

7. To ensure a multiplier effect of the intervention by training teachers to become trainers for the implementation of CBIS.

8. To enable students to develop the appropriate cognitive skills that will allow them to cope with the information processing demand imposed upon them by various academic tasks.

9. To enhance probability of high school completion by helping students to improve their academic achievement, demonstrate a more positive attitude toward school, exhibit less disruptive behaviour, attend school more regularly, participate in school activities and, finally, demonstrate a more aggressive learning style.

METHODS

Demonstration Sites, Population and Sample

The target population for this CBIS dropout prevention project was junior high school students who have been identified as potential dropouts. Four junior high school sites were included in this demonstration project. Three of these sites were schools where English is the language of instruction. The fourth site was a French school.

The site selection was made by a panel of professionals consisting of University of Manitoba project staff, representatives of the Manitoba Department of Education and Training, and Program Directors of Employment and Immigration Canada. Panel members first generated a set of specific site, teacher and students selection criteria. These criteria were used to profile appropriate sites, teachers and students for this demonstration project. Finally, this profile was used for selecting four city schools to implement the project.

In consultation with the school principals, a purposive sample of eight teachers (two from each site) and all their students in one intact class (for each teacher) were selected. Three resource teachers (from three different sites) were included in the project at the request of their school principals.

Teachers participating in this project had to perform the CBIS augmentation and transfer training with their students over and above their regular teaching duties. Three incentives were therefore built into the project design for participating teachers: (1) a student-teacher was assigned to each CBIS teacher to create more opportunities for the teachers to work with their CBIS students; (2) the Dean of the Faculty of Education, University of Manitoba, agreed to give all teachers participating in the CBIS project six credit hours towards a Post-Baccalaureate Certificate in Education, in recognition for the CBIS training; and (3) the CBIS teachers were paid at a substitute rate for attending the Saturday training sessions. This third incentive was essential because it was impractical to withdraw the CBIS teachers from their teaching duties for training purposes.

Eight student-teachers from the Faculty of Education, University of Manitoba, also participated in this project. They were each assigned to work with one CBIS teacher. A

purpose-made schedule was drawn for the student teachers to enable them to be in the schools at least once a week, throughout the semester.

Permission to conduct this demonstration project was obtained from three school divisions and four school principals. Parental or guardian consent was also obtained for all students included in the project.

Procedure

This project was implemented in September 1991 and the activities spanned across the whole school year. The project implementation included three main phases.

Phase I. During Phase I, all participating teachers received 7 full days of training in the Cognitive Based Instructional System. Teachers were briefed on project goals, objectives, procedures and anticipated outcomes. They were introduced to the Cognitive Based Instructional System and trained to administer the Cognitive Profile Assessment Instrument and analyse the results. They were also trained to use some basic augmentation and transfer strategies to modify students' cognitive profile. Students were not involved in these teacher training sessions and all training was delivered through role play in a simulated setting.

Phase II. During Phase II, project staff and teachers assessed the cognitive profile of all the students included in the eight intact groups (N = 175) using the computerized version of Dr. Letteri's Cognitive Profile Assessment Instrument (CAI). This test is administered to students on an individual basis. The average administration time is approximately one hour per student. A specifically assembled battery of tests was also administered to these students. The tests included in this battery were: (1) the Canadian Test of Basic Skills - form 7, from Nelson Canada; (2) the Culture Free Self-Esteem test from Special Child Publications; (3) School

Attitude Measure fom American Testronics; and (4) Dropout Prediction Scale from The Ohio State University.

Students were classified as Type 1, 2 or 3 according to their performance on the CAI. All Type 3 and extreme Type 2 students (N=45) were selected for the CBIS cognitive augmentation and transfer training. The other students in the intact groups were considered as a non equivalent control group to provide some basis for making comparative analyses.

The forty-five students selected for the CBIS training were assigned to the eleven teachers involved in the project. The average teacher-student ratio for the CBIS training was 4. Each student received an average of one hour of CBIS training per week spread over October 1991 to April 1992.

The teachers used some basic augmentation strategies to modify the cognitive profile of their Type 2 and 3 students. The objective was to enable Type 2 and 3 students to perform as Type 1 on cognitive tasks. Students were given training and practice in the skills of monitoring, directing and controlling their information processing system.

The CBIS teachers also received on-site individualized training and coaching while they were working on the augmentation strategies with their students. Three CBIS training workshops were also held on Saturdays for the CBIS teachers and student-teachers. Additionally, 30 hours of videotaped training materials were specifically developed and given to the CBIS teachers as a form of individualized training to reinforce concepts presented during group sessions.

Phase III. During this phase, advanced training was provided to the CBIS teachers to enable them to help students who had already developed the appropriate cognitive skills to transfer these

skills to various academic tasks within the school curriculum. They also received on-site individualized training and coaching while they were working on the augmentation and transfer strategies with their students. Three CBIS training workshops were held on Saturdays for the CBIS teachers and student-teachers. These workshops focused on the development of advanced skills and were also designed to help teachers to implement the CBIS model in the whole classroom context.

Sustainability of Project

During the last phase of this project a considerable amount of effort was devoted to ensure the sustainability of the CBIS project. Various stakeholders were consulted regarding the integration of CBIS training as part of regular school services. A collaborative team was formed in one school division to ensure the sustainability of CBIS training. That team developed and submitted a proposal to funding agencies. A copy of this proposal is attached to this report (Appendix C).

Project Evaluation

At the completion of the CBIS project, a comprehensive program evaluation was carried out. This evaluation effort attempted to outline the results of the CBIS project and determine what factors contributed to the results or interfered with the achievement of the desired results. More specifically, the evaluation was designed to provide useful information regarding the effectiveness of the Cognitive Based Instructional System in helping At-Risk students to cope with the information processing demand imposed upon them through learning enhancement training.

The evaluation design was guided by the experimental paradigm using a pretest -- posttest design with a nonequivalent control group. The pretest was administered at the beginning of the project in September/October, 1992. The same instruments were used for pre and post test, the only exception being the Canadian Test of Basic Skills (CTBS). Two forms (7 pretests and 8 posttests) of CTBS were used. These instruments were: (1) Dr. Letteri's Cognitive Profile Assessment Instrument (CAI). (2) the Canadian Test of Basic Skills - form 8; (3) the Culture Free Self-Esteem test; (4) School Attitude Measure; and (5) Dropout Prediction Scale.

As part of the evaluation process, all school administrators of CBIS site, CBIS teachers, CBIS students and CBIS student-teachers were interviewed during debriefing sessions. The CBIS students were debriefed in small groups (n=5), whereas school administrators, teachers and student-teachers were interviewed on a one-to-one basis using the face-to-face interview format.

Follow-up of CBIS students

A follow-up study was conducted in January 1994, that is two and a half years after the initial project implementaiton. All four schools involved in the CBIS project were surveyed in order to determine the status of the CBIS students. This follow-up was designed to provide additional evidence regarding the effectiveness of the CBIS as dropout prevention strategy.

RESULTS

Dropout Prediction

Students' potential for dropping out of school was assessed using the Dropout Prediction Scale (Weber, 1989). Figure 1 shows the pretest and posttest results of the dropout prediction for students included in the treatment (n=45) and control groups (n=27). Results indicated that 8 students in the treatment group and 3 in the control group met the cutoff level criterion to be identified as potential dropout on the pretest. The number of potential dropouts among the treatment and control group did not change substantially on the posttest (9 and 3 respectively). Further analysis of pretest and posttest results indicate that the at-risk status of 5 of the 8 students included in the treatment group was unaltered, while 3 students experienced a positive change, whereas 4 others moved from a non-dropout prone to an at-risk status. Similarly, 2 of the students in the control group remained at-risk from the pretest to the posttest, 1 moved from an at-risk status to that of a non potential dropout. One student experienced a negative change.

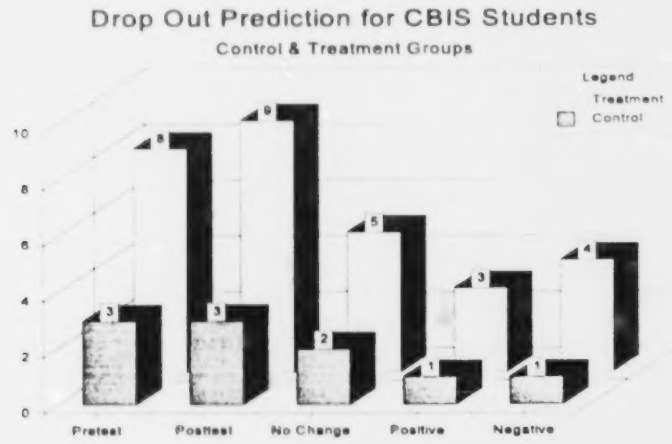

Figure 1

Cognitive Profile

The cognitive profile of all students included in the eight intact groups was assessed using Dr. Letteri's Cognitive Profile Assessment Instrument (CPAI). Forty-five students were selected from eight intact groups for the CBIS training intervention (Treatment Group) and 27 others were randomly selected from these same groups, as a nonequivalent control group. Students were classified as Type 1, 2 or 3 according to their performance on the CPAI. Table 1 shows the frequency and percentage distribution of the treatment and control group by Type 1, 2 or 3 on the pretest.

Table 1

Frequency and Percentage Distribution of Treatment and Control Group by Overall Type 1, 2 and 3 on Pretest.

	Type 1		Type 2		Type 3	
	f	%	f	%	f	%
Treatment	0	0	33	73	12	27
Control	7	26	19	70	1	4

As shown in Table 1, the treatment group included 12 Type 3 students and no Type 1 individuals. The majority (73%) of the students in the treatment group had a Type 2 profile. In is noteworthy, that the control group consisted of only one Type 3 student and approximately an equal percentage (70%) of Type 2 students as in the treatment group. The major difference in the distribution of the students from treatment and control group was among Type 1 (0 % and 26 %) and 3 (27% and 4%) students. Table 2 shows a detailed breakdown of the distribution of the

treatment and control group across the seven cognitive controls encapsulated in the three cognitive profile Types 1, 2 and 3. The analysis which follows is based on data presented in Table 1. Additional figures and tables are presented to enable separate analysis of the treatment and control group, and also to facilitate relevant comparisons between these groups.

Table 2

Frequency and Percentage Distribution of Students by Cognitive Controls for Treatment and Control Groups on Pretest.

Cognitive Controls	Type 1				Type 2				Type 3			
	Treatment		Control		Treatment		Control		Treatment		Control	
	f	%	f	%	f	%	f	%	f	%	f	%
Analytical	16	35	15	55	25	56	11	41	4	9	1	4
Focus	22	49	21	78	12	27	6	22	11	24	0	0
Reflective	13	29	14	52	10	22	6	22	22	49	7	26
Narrow	9	20	2	8	20	44	16	59	16	36	9	33
Complex	8	18	9	33	17	38	16	59	20	44	2	8
Sharpener	8	18	10	37	22	49	12	44	15	33	5	19
Tolerance	2	4	1	4	12	27	10	37	31	69	16	59

As shown in Figure 2, very few students from the treatment group were classified as Type 1 on tolerance (2), sharpener (8), complex (8) and narrow (9). The students were fairly evenly distributed between Type 2 and 3 in these cognitive controls, except in tolerance. The great majority of these students (31) were classified as Type 3 in tolerance. It is interesting to note that a fairly large number of students were classified as Type 1 in analytical (16), focus (22) and reflective (13).

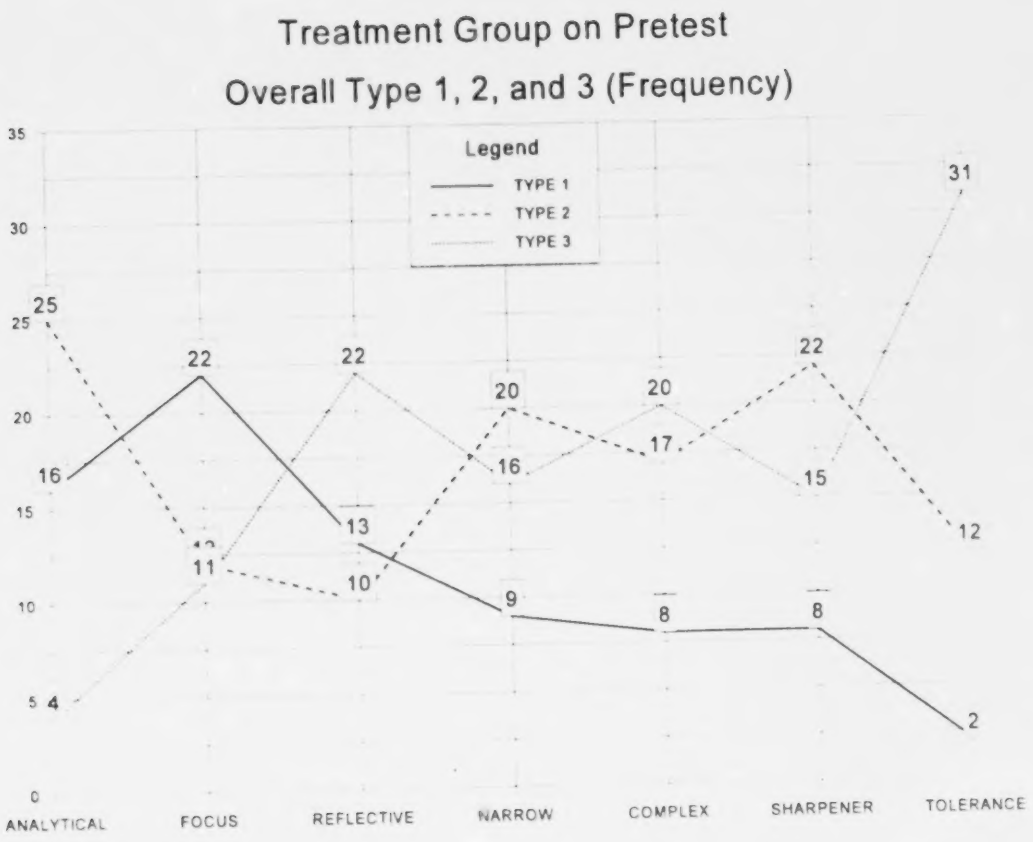

Figure 2

Examination of the CPAI pretest results for the control group (Figure 3) shows that very few students were classified as Type 1 on tolerance (1) and narrow (2). A fairly large number of students were classified as Type 1 in analytical (15), focus (21) and reflective (14). Many of these students were classified as Type 2 on narrow (16), complex (16) and sharpener (12). As shown in Figure 3, there was no Type 3 students in focus, only one in analytical and two in complex.

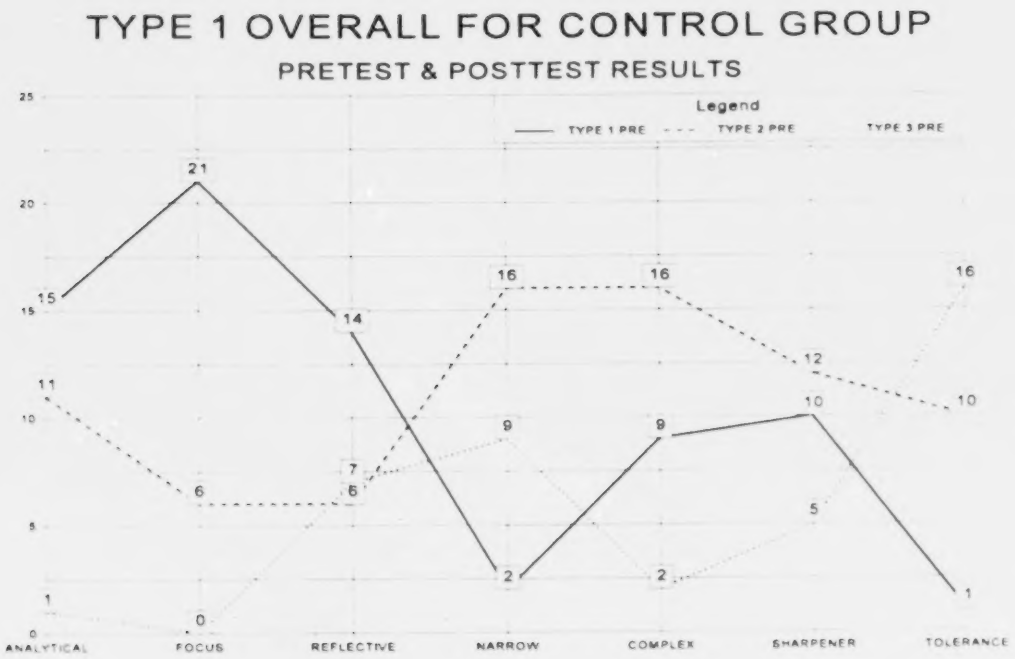

Figure 3

Table 3 provides a comparison of the pretest and posttest results for cognitive profile type by treatment and control groups. It is noteworthy that while there was no Type 1 student in the treatment group on pretest, ten of these students scored as Type 1 on the posttest. This shift was accompanied by a reduction in Type 2 and Type 3 students (5 in each case). Examination of the pretest and posttest distribution of the students in the control group reveals that there was an augmentation of nine (9) Type 1 student in that group. There was also a decrease (9) in Type 2 students for the control group.

Table 3

Frequency and Percentage Distribution of Treatment and Control Group by Overall Type 1, 2, 3 on Pretest and Posttest

	Type 1				Type 2				Type 3			
	Pretest / Posttest				Pretest / Posttest				Pretest / Posttest			
	f	%	f	%	f	%	f	%	f	%	f	%
Treatment	0	0	10	22	33	73	28	62	12	27	7	16
control	7	26	16	59	19	70	10	37	1	4	1	4

Table 4, provides a detailed breakdown of the distribution of the treatment and control group by type, across the seven cognitive controls. The analysis which follows is based on data presented in Table 3. Additional figures and tables are also presented to enable separate analyses of treatment and control group and to facilitate comparisons between these groups.

As shown in Figure 4, approximately half of the students in the treatment group were classified as Type 1 on analytical (25), focus (24) and reflective (22). Only a small number of students were grouped as Type 1 on narrow (9) and complex (10). None of the treatment group students scored Type 1 on tolerance and only three were classified as Type 2. There were no Type 3 students on analytical and students were somewhat evenly distributed between Type 1 and Type 2 on the analytical cognitive control. There were only a few Type 3 students in focus and sharpener.

Table 4
Frequency and Percentage Distribution of Students by Cognitive Controls for Treatment and Control Groups on Posttest.

Cognitive Controls	Type 1				Type 2				Type 3			
	Treatment		Control		Treatment		Control		Treatment		Control	
	f	%	f	%	f	%	f	%	f	%	f	%
Analytical	25	56	23	85	20	44	4	15	0	0	0	0
Focus	24	53	25	93	15	34	0	0	6	13	2	7
Reflective	22	49	16	59	7	16	7	26	16	35	4	15
Narrow	9	20	8	30	24	53	15	55	12	27	4	15
Complex	10	22	5	19	19	42	16	59	16	36	6	22
Sharpener	21	47	20	74	18	40	6	22	6	13	1	4
Tolerance	0	0	1	4	3	7	2	7	42	93	24	89

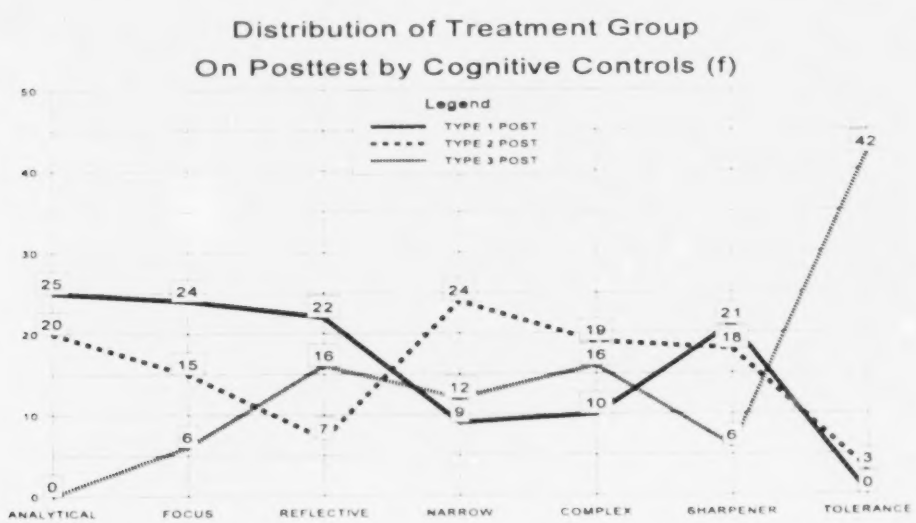

Figure 4

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Examination of the posttest data for the control group (Figure 5), reveals that the great majority of the students scored Type 3 on tolerance. However, only a few of these students were classified as Type 3 in the other cognitive controls. The majority of the students were classified as analytical (23), focus (25) and sharpener (20). A fair number of students (16) were also classified as Type 1 on reflective. It is interesting to note that about two-third of the students in the control group scored Type 2 on narrow (15) and complex (16).

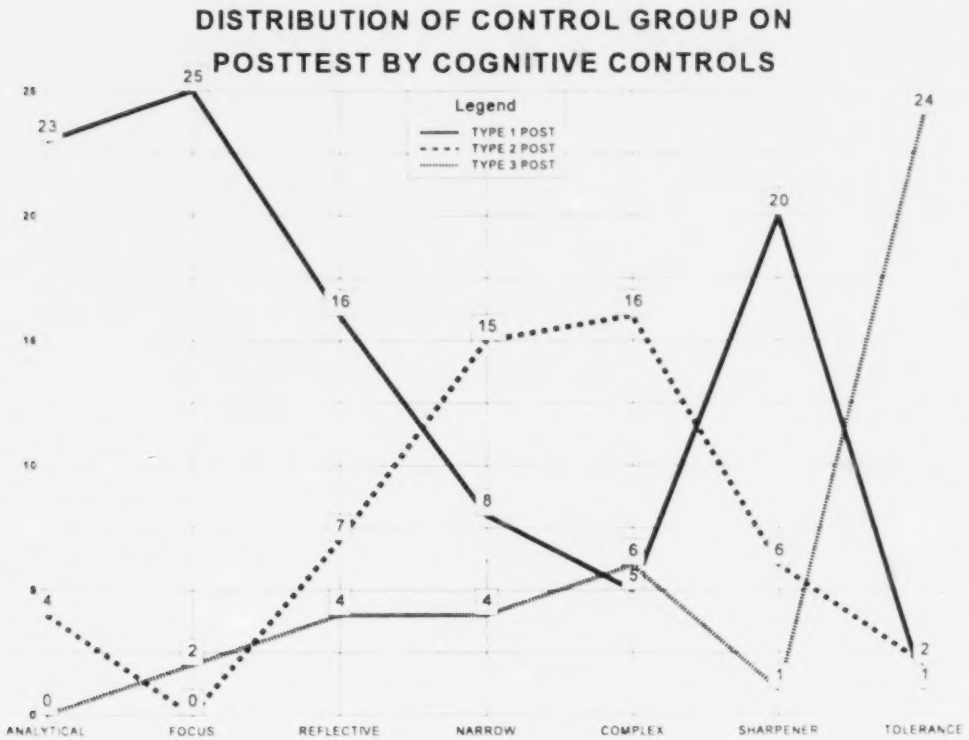

Figure 5

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Figure 6, shows the percentage distribution of the treatment and control group by overall Type 1, 2 and 3 on pretest and posttest. Examination of the bar chart indicates that both treatment and control groups made some gain in Type 1 profile. The control group made no gain in Type 3 profile, whereas a substantial drop in Type 3 was observed in the treatment group students. The substantial gain made by the control group in Type 1 profile (31%) is directly related to the diminishing proportion of students (33%) scoring Type 2 on the posttest. The same template cannot be easily used for analysing the Type 1 gain of the treatment group because of the shift of students from Type 3 to 2 and Type 2 to 1.

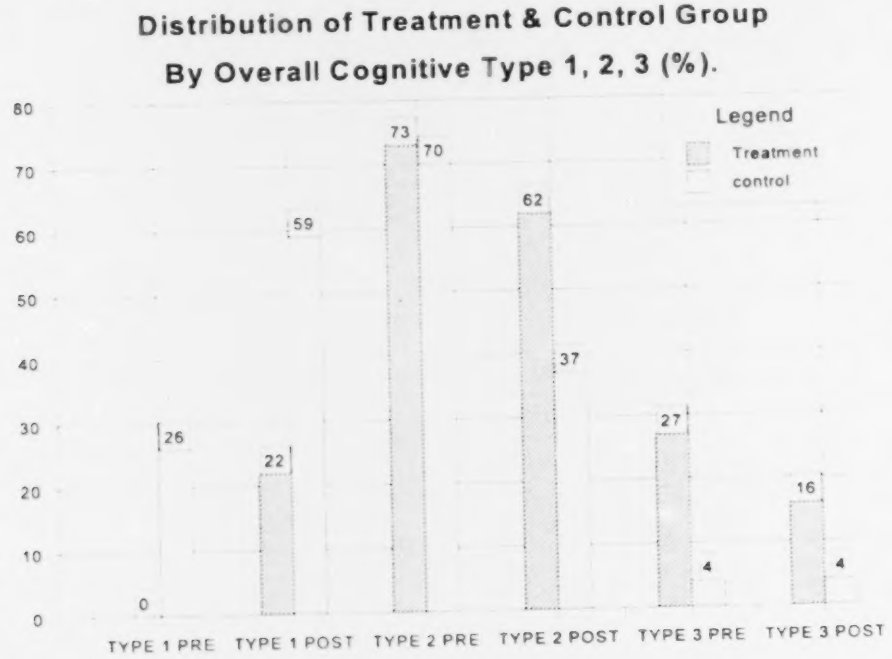

Figure 6

The pretest and posttest cognitive profile data for the treatment group were further analysed by the three types classification (Type 1, 2, 3). Figures 7, 8 and 9 depict the distribution of the treatment group students by pre/posttest and cognitive profiles 1, 2 and 3 respectively.

As shown in Figure 7, there was some augmentation in the number of Type 1 students from the pretest to the posttest on 6 of the cognitive controls. While the augmentation was moderate for analytical (9) and reflective (9), it was somewhat substantial for sharpener (13). There was little gain for focus (2) and complex (2) and no gain on narrow. There was a lost of two Type 1 students from pre to posttest on tolerance.

Figure 8, shows the distribution of the Type 2 by pretest and posttest. A large number of

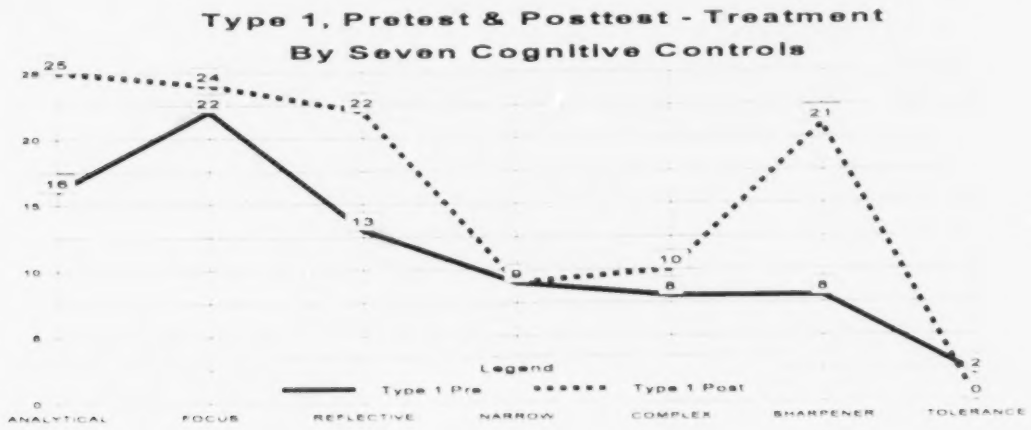

Figure 7

students was classified as Type 2 on both pre and posttest on analytical, narrow, complex and sharpener (Figure 8). Additional interpretation of the group-based data was not appropriate at this level because a drop in Type 2 may mean a shift to Type 1 or a shift to Type 3.

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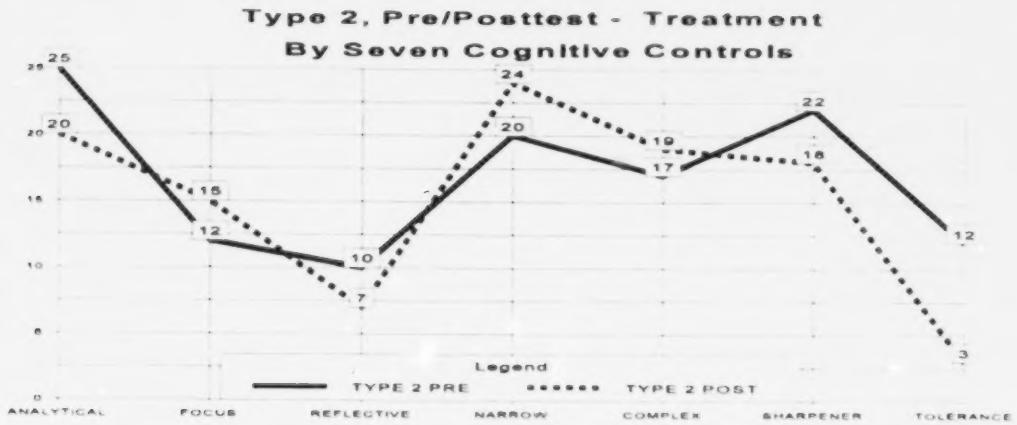

Figure 8

Figure 9 indicates that there was an almost even drop in the number of Type 3 students from the pretest to the posttest on 6 of the cognitive controls. It is noteworthy that there was an augmentation of 11 Type 3 students from the pretest to the posttest on tolerance. It is also interesting to note that a significant number of students were classified as Type 3 on both the pre and posttest on tolerance.

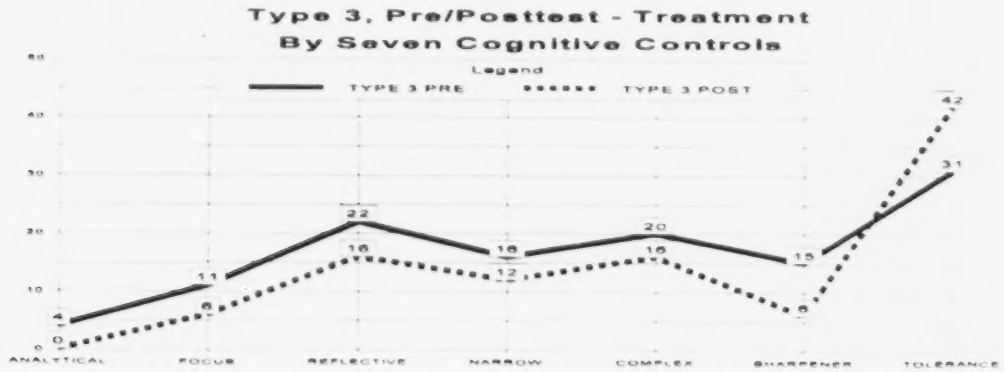

Figure 9

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The pretest and posttest cognitive profile data for the control group were further analysed by the three types classification (Type 1, 2, 3). Figures 10, 11 and 12 depict the distribution of the control group students by pre/posttest and cognitive profiles 1, 2 and 3 respectively.

As shown in Figure 10, there was some augmentation in the number of Type 1 students from the pretest to the posttest on 6 of the cognitive controls. While the augmentation was moderate for analytical (8) and narrow (6), it was somewhat substantial for sharpener (10). There was little gain for focus (4) and reflective (2) and no gain on tolerance. There was a lost of four Type 1 students from pre to posttest on complex.

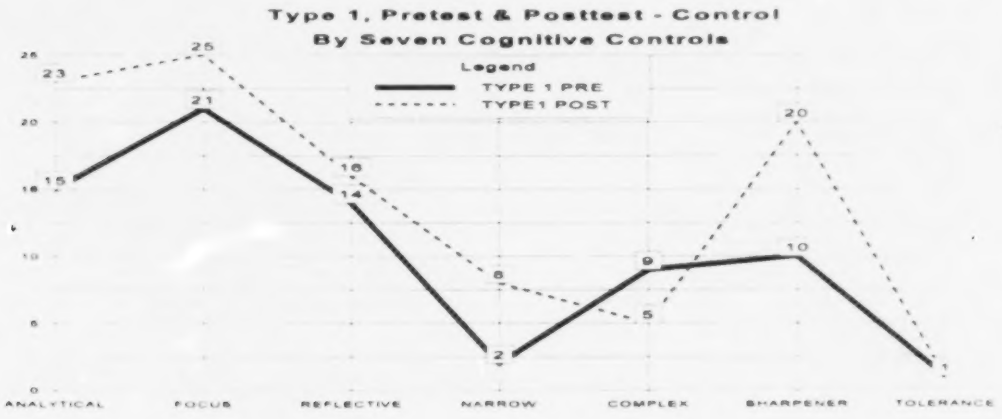

Figure 10

Figure 11, shows the distribution of the Type 2 by pretest and posttest. A large number of students were classified as Type 2 on both pre and posttests on narrow and complex (Figure 11). Additional interpretation of the group-based data was not appropriate at this level because a drop in Type 2 may mean a shift to Type 1 or a shift to Type 3.

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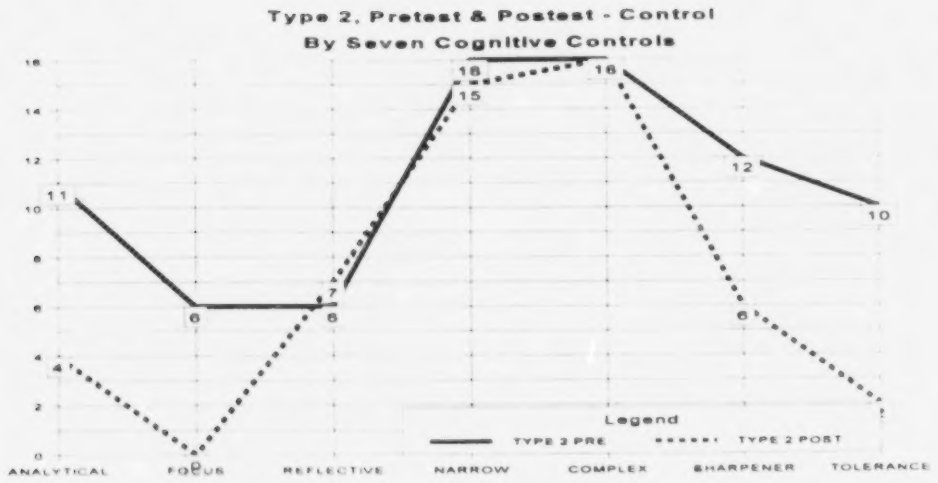

Figure 11

Figure 12 indicates that there was a drop in the number of Type 3 students from the pretest to the posttest on 4 of the cognitive controls. It is noteworthy that there was an augmentation of 8 Type 3 students from the pretest to the posttest on tolerance. It is also interesting to note that a significant number of students were classified as Type 3 on both the pre and posttest on tolerance. Results also indicate a small increase in the number of Type 3 students from pretest to posttest on focus and complex.

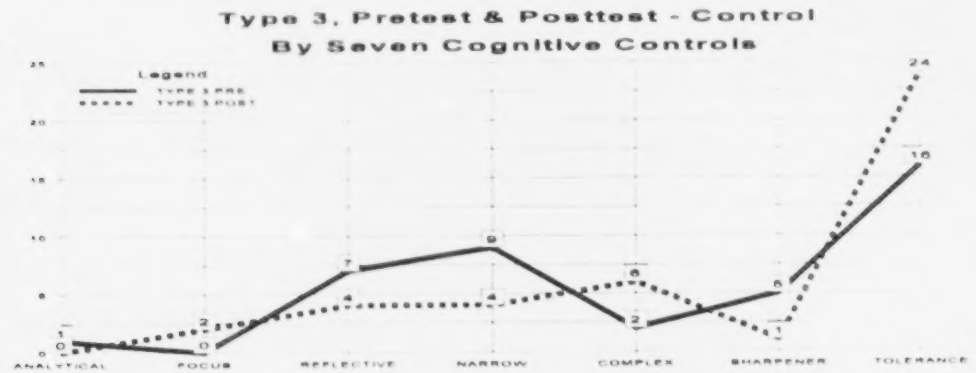

Figure 12

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The cognitive profile data were analysed to determine the nature of the overall cognitive profile change as well as specific changes for each cognitive profile type, for the treatment and control groups. Slightly more than half of the students in the treatment group did not experience any change in cognitive profile, whereas 38% had some form of positive change (Figure 13). Only three incidences of negative change were recorded among these students (Table 5). It is interesting to note that although the control group was not subjected to any form of treatment, 44% of the students recorded a positive change in cognitive profile.

Table 5

Nature of Overall Cognitive Profile Change by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	25	55	17	38	3	7
Control	12	44	12	44	3	12

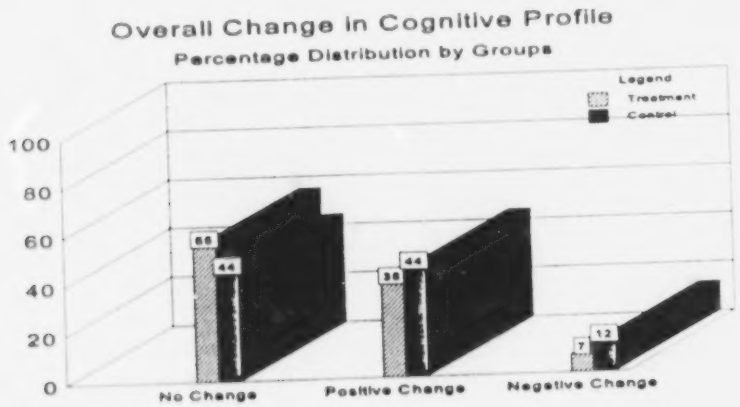

Figure 13

Results indicate that approximately 50% of the treatment group students did not experience any change in cognitive profile type complex and almost one third of the students recorded positive changes (Table 6). Only 4 students in the control group showed a positive change on complex. Surprisingly, 44% of students in this group had a negative change.

Table 6

Nature of Cognitive Profile Change "Complex" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	24	53	14	31	7	16
Control	11	41	4	15	12	44

Repeated measures ANOVA for the cognitive control Complex showed no significant difference between treatment and control groups on pre and posttest. While the difference for the treatment group across time was not significant, it was however significant for the control group (Table 1, 2 and 3 in, Appendix A).

One third of the students in the treatment and control groups showed a positive change in cognitive control Analytical and very few of these students experienced a negative change (Table 7). An equal percentage of both treatment and control group students recorded no change on analytical (62% and 63% respectively).

Repeated measures ANOVA for the cognitive control Analytical indicated a significant difference between treatment and control group. There was also a significant difference in both groups across time. However, no significant time-group interaction effect was found (Table 4, 5 and 6, Appendix A).

Table 7

Nature of Cognitive Profile Change "Analytical" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	28	62	15	34	2	4
Control	17	63	9	33	1	4

Analysis of the cognitive profile change for the reflective control reveals that one third of the students in the treatment group experienced a positive change, while 13% experienced a negative change (Table 8). Results also indicated the same proportion of students in the control group recorded positive and negative changes (11% en each case).

Table 8

Nature of Cognitive Profile Change "Reflective" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	24	53	15	34	6	13
Control	16	59	8	11	3	11

Repeated measures ANOVA for the cognitive control Reflective indicated a significant difference between treatment and control group. There was no significant difference in both groups across time and no significant time-group interaction effect was found (Table 7, 8 and 9, Appendix A).

As shown in Table 9, a high percentage (58%) of the treatment group students experienced a positive change on the cognitive control Sharpener, whereas 18% showed a

negative change. Nearly half of the students in the control group also experienced a positive change on the same cognitive control.

Table 9

Nature of Cognitive Profile Change "Sharpener" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	11	24	26	58	8	18
Control	12	45	13	48	2	7

Only a small percentage (20%) of the treatment group students experienced a positive change on the cognitive control Focus. However, 24 % of these students showed a negative change. It is noteworthy that the great majority (74%) of the control group students recorded no change on this cognitive control.

Table 10

Nature of Cognitive Profile Change "Focus" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	25	56	11	20	9	24
Control	20	74	5	19	2	7

Repeated measures ANOVA for the cognitive control Focus indicated a significant difference between treatment and control group. There was no significant difference in both groups across time and no significant time-group interaction effect was found (Tables 10, 11 and 12, Appendix A).

While the majority (55%) of the treatment group students did not experience any change on cognitive control Narrow, 27% experienced a positive change and 18% showed a negative change (Table 11). Results also indicated that an equal proportion of the control group students recorded positive changes or no change (44%).

Table 11

Nature of Cognitive Profile Change "Narrow" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	25	55	12	27	8	18
Control	12	44	12	44	3	12

Repeated measures ANOVA for the cognitive control Narrow indicated no significant difference between treatment and control group. There was a significant interaction between group and time. The treatment group had higher performance mean on the posttest than the control group. However, the performance was not significantly different for both treatment and control groups (Tables 13, 14 and 15, Appendix A).

Results indicated that the great majority of the treatment group students did not experience any change on cognitive control "Tolerance" (Table 12). Only 4% of these students showed some positive change, where as a fairly high proportion recorded a negative change. It is important to note that 37% of the control group students also experienced a negative change.

Table 12

Nature of Cognitive Profile Change "Tolerance" by Treatment and Control Groups

	No Change		Positive Change		Negative Change	
	f	%	f	%	f	%
Treatment	30	67	2	4	13	29
Control	14	52	3	11	10	37

Repeated measures ANOVA for the cognitive control Tolerance indicated no significant difference between treatment and control group. There was no significant interaction between group and time and no significant difference across time for both (Tables 16, 17 and 18, Appendix A).

Finally, analysis of the nature of change by overall cognitive profile type for the treatment group revealed that 47 per cent experienced no change, 20 per cent moved from Type 2 to 1; 2 per cent moved from Type 3 to 1; 16 per cent moved from Type 3 to 2; and 7 per cent experienced a negative change, moving from Type 2 to 3 (Table 13 & Figure 14). Results also indicated that 44 percent of the control group students moved from Type 2 to 1 and 11 percent experienced a negative change moving from Type 1 to 2.

Table 13

Nature of Change by Overall Cognitive Profile for Treatment and Control Groups (%)

	No Change			Positive change			Negative Change	
Type	1	2	3	2 to 1	3 to 1	3 to 2	1 to 2	2 to 3
Treatment		47	9	20	2	16		7
Control	15	26	4	44			11	

It is interesting to note that 38 per cent of the students in the treatment group experienced positive changes overall and only 7 percent recorded some form of negative changes.

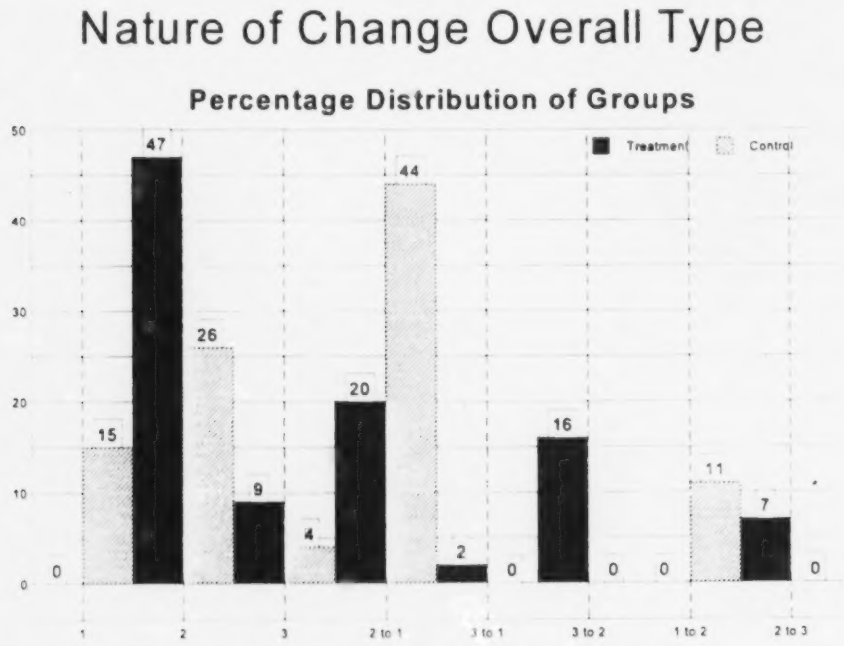

Figure 14

Self-Esteem

The Culture Free Self-esteem Test was administered to the treatment and control groups. This test includes five scales, namely: (1) general; (2) social; (3) academic; (4) parental; and (5) overall. Table 14 shows the Means for the treatment and control groups on the pre and posttest.

Table 14

Pre and Posttest Results on Culture Free Self-Esteem

Sub-Scales	Treatment		Control	
	Pretest	Posttest	Pretest	Posttest
General	6.9	6.83	7.31	7.53
Social	3.45	3.55	3.44	3.84
Academic	3.26	3.24	4.16	3.97
Parental	3.92	4.09	4.09	3.78
Overall	17.6	17.41	19	19.13

The repeated measures ANOVA was used for analysing the self-esteem data (Tables 19 to 36, Appendix A). Results for all five scales indicated no significant difference on the general scale self-esteem between the treatment and control group on the pretest and posttest. There was no significant interaction between group and time and no significant difference across time for the treatment group. However, a significant difference was found for the control group between pre and posttest on the social scale (X = 3.44 and 3.84 respectively).

School Attitude Measure

The School Attitude Measure, Level I/J, was administered to the treatment and control groups. This test includes five scales, namely: (1) motivation for school; (2) self-concept, performance-based; (3) self-concept; reference-based; (4) sense of control over performance; and (5) instructional mastery. Table 15 shows the Means for the treatment and control groups on the pre and posttest. There was not much difference between the pre and posttest for the treatment

and control group. In both cases the post test mean scores were, in general, slightly lower that the pretest scores.

Table 15

Pretest and Posttest Results on School Attitude Measure

	Treatment		Control	
Sub-Scales	Pretest	Posttest	Pretest	Posttest
Motivation	44.52	42.76	48.49	46.58
Performance	38.36	36.83	44.73	43.3
Reference	38.43	36.38	42.76	41
Sense of control	50	50.21	55.85	54.55
Mastery	40.93	38.81	44.42	42.58

The repeated measures ANOVA was used for analysing the School Attitude Measure (Table 37 to 51, Appendix A). Results for the motivation scale indicated a significant difference between treatment and control group. While there was no significant interaction between group and time, the difference in pretest and posttest was significant, irrespective of the group. No significant difference across time for treatment and control group was found.

Results for the performance scale indicated a significant difference between treatment and control group. There was no significant interaction between group and time and no significant difference in pretest and posttest, irrespective of the group. No significant difference across time for treatment and control group was found.

Results for the reference scale indicated a significant difference between treatment and control group. While there was no significant interaction between group and time, the difference

in pretest and posttest was significant, irrespective of the group. No significant difference across time for treatment and control group was found.

Results for the sense of control scale indicated a significant difference between treatment and control group. There was no significant interaction between group and time and no significant difference in pretest and posttest, irrespective of the group. No significant difference across time for treatment and control group was found.

Results for the instructional mastery scale indicated a significant difference between treatment and control group. While there was no significant interaction between group and time, the difference in pretest and posttest was significant, irrespective of the group. No significant difference across time for treatment and control group was found.

Canadian Test of Basic Skills (CTBS) - Math Scores

The repeated measures ANOVA was used for analysing the CTBS raw scores in math (Tables 65 to 67, Appendix A). Results indicated a significant difference in performance between the treatment and control group. There was also a significant interaction between group and time. While the difference in performance (means 20.03 and 24.68) from pretest to posttest for the control group was significant, there was no significant difference in the treatment group across time.

Results of the math raw scores for the treatment group were further analysed in order to identify any form of improvement in performance from pretest to posttest. As shown in Table 16 there was a slight positive increase in performance from pretest to posttest (+1.2). Data also indicates that there was a slightly greater percentage (57%) of students in the treatment group who experienced a positive change as compared to those experiencing a negative change (39%).

Table 16

Canadian Test of basic Skills Math Raw Scores for Treatment Group (N=44).

	Mean	Positive Change		Negative Change		No Change	
		n	%	n	%	n	%
Pretest	14.4	25	57	17	39	4	10
Posttest	15.6						

Canadian Test of Basic Skills (CTBS) - Reading Scores

The repeated measures ANOVA was used for analysing the CTBS raw scores in reading (Tables 68 to 70, Appendix A). Results indicated a significant difference in performance between the treatment and control group. There was also a significant interaction between group and time. The difference in performance from pretest to posttest was significant for both the treatment (means 21.78 and 19.61) and control groups (means 25.52 and 31.62). It must be noted, however, that the treatment group had a lower mean score on the posttest.

Results of the reading raw scores for the treatment group were further analysed in order to identify any form of improvement in performance from pretest to posttest. As shown in Table 17, there was a positive increase in performance from pretest to posttest (+2.1). Data also indicates that there was a greater percentage (73%) of students in the treatment group who experienced a positive change as compared to those experiencing a negative change (27%).

Table 17

Canadian Test of basic Skills Reading Raw Scores for Treatment Group (N=44).

	Mean	Positive Change		Negative Change		No Change	
		n	%	n	%	n	%
Pretest	19.6	32	73	12	27	4	10
Posttest	21.7						

FOLLOW-UP OF CBIS STUDENTS

The objective of this demonstration project was to assess the effectiveness of the CBIS as a dropout prevention strategy. The underlying assumption of this project was that many students drop out of school because they are unable to cope with the information processing demand imposed upon them by school learning. It was further assumed that if these students are empowered with enhanced learning skills, school learning will become a rewarding experience and they will likely stay in school. A follow-up study was conducted in January 1994, that is two and a half years after the initial project implementation. The purpose was to provide additional evidence regarding the effectiveness of the CBIS as a dropout prevention strategy. All four schools involved in the CBIS project were surveyed in order to determine the status of

the CBIS students. Only three out of the four schools responded to the survey. Therefore, data was available for 30 out of the 44 CBIS students.

Only 3 out of these 30 (9.9%) at-risk students had dropped out of school. One of these students was required to withdraw because of irregular attendance although he was performing well academically and socially. The two other students had behavioral problems and one of them even encountered problems with the law.

Further analysis of the school survey indicates that nearly all the other 27 CBIS students were doing well academically and only four were experiencing some difficulties with their school work. The majority of these students was demonstrating a positive attitude toward school and were not experiencing behavioural problems in school.

CBIS TEACHERS REFLECTION IN ACTION

All CBIS teachers were requested to keep a reflective journal to document their experiences with the cognitive based learning process. The purpose was to generate information regarding any change in belief about teaching and learning as a result of their participation in the CBIS project. Eight of the twelve CBIS teachers handed in their journal for analysis. The journal writings were carefully analysed and classified into major categories and themes in order to gain a better understanding of the teachers' experiences in action. Five major categories emerged from this analysis: (1) teachers' expectations; (2) the learning process; (3) students' needs; (4) teachers'

needs; and (5) changes in teachers' beliefs and practices. Teachers' reflections in each of these categories are presented in the section that follows.

1. TEACHERS' EXPECTATIONS

Only three of the teachers expressed initial feelings about the CBIS project and their comments reflect high hope and great expectations.

> "I feel completely revitalized and at the same time drained."
>
> "I find this pilot almost all consuming in my thoughts . . . I really think this program could open doors for the kids. Finally a logical, sequential approach!"
>
> "When the lights go on in (the students') eyes because they suddenly made sense out of something that was previously nonsense it makes all the effort worthwhile. I am convinced, and pray with all my heart that stats prove that this program can work, and maybe give kids especially like B and J - the resources to succeed in school."
>
> "Drop out prevention through cognitive-based instruction system's objective is to train the student within the 7 Cognitive Areas. Remediation/augmentation will give the potential drop out the academic skills required to complete high school curricula."
>
> "This pilot project represents a new opportunity to help students and give teachers a new tool to help educate."
>
> "I wonder if there is a little more to this than augmentation of the student. I wonder if there is research being done on teachers here: augmentation of the teacher."

2. THE LEARNING PROCESS

2.1 The Basis: Analysis and Focusing

All eight teachers frequently referred to analysis and focusing and agreed they were the foundation that must be well established.

"I learned something. If stuck, just go back to analysis and have it on paper. Then go through it and the solution presents itself."

"I had her select 2 poems in my book and then we set out to do the similarities and differences. Problem: the task appears impossible as she said nothing was the same. I then told her we'll do an analysis. So I selected the points and we reread and made a listing. Then we went through each point and noted the contrast and similarities. We were able to get 9 statements."

"All (students) found the task of Analysis much easier-seem as: becoming more worthwhile, not as taxing an exercise, a part of a way of doing things now."

"With R., if at all possible we analyse the pictures in the texts because the written part is too difficult. I am trying to show him that analysis of pictures and diagrams can often tell us everything that is in the text. He enjoys doing this."

"I'm feeling a bit "ancy" to try new stuff - but at the same time I realise the students need lots of practice at this stuff (analysis & focus) in all subject areas."

2.2 Mnemonics

The use of mnemonics seemed to be a treat for both teachers and students. It had quick and visible rewards.

"I asked him to memorize the poem. He said he could not. I told him I would show him a way. I developed mnemonics for him. He did state the poem from memory!!! What a breakthrough."

"She memorized the poem by using the nonsense word/line. She was pleased as she never had before recited a poem."

"M memorized successfully the correct order of the provinces from West to East. H and M developed a rap song for integer rules. All three could repeat after end of session."

3. STUDENTS NEEDS

3.1 "Discoveries" about Students and Current Teaching Practices

As the teachers worked with their students, some began to see things "through a different window". They seemed to become more sensitive to student needs which led to changes in their beliefs about teaching.

"I am struck by how much assumption there is in teaching, how global we are in our content, and how little time or consideration is given to the student and what we are asking them to do."

"Upon now realizing the variation in students' ability to analyse, and the importance of this cognitive skill in learning, I find myself rethinking how I

issue notes and model example questions. I realize the need for specificity and clear illustration."

"One thing about CBIS that impressed me the most was how it made me see things through a different "window". This seems to be hard to explain unless you've done it, but it really helps to see things:

a) from a student's perspective.

b) not to take for granted that students understand everything they read - even though they may say they do."

"Students experiencing difficulty in Math/Science tend to lack reflectiveness. I understand the truth of this statement to a much fuller extent now. Also, I believe, we as teachers often engineer out the reflectiveness that students may possess. In Mathematics the repetitive approach used to develop and reinforce computation skills is often void of the need for reflectiveness . . . If this in fact is the case then computational should frequently be presented using problem solving as a vehicle."

"This process (using an idea tree to summarize a paragraph) initially demonstrated how little information J initially captured on his own compared to what Charles was able to elicit."

"He had studied fractions for 2 years and he was unable to name a fraction . . . And yet when reading the objective he does remember words such as 'strategy' and complex, from previous lessons."

"It is interesting the number of questions the students will work when the pressure to provide a solution is removed."

Teachers realized that simply the vocabulary used in directions can be a severe stumbling block for a student:

"I asked P to explain the first question. P did not accurately understand the vocabulary and therefore obviously would not be able to do the question. The first question began with the word 'calculate'. P thought that meant 'add'. We talked about mathematical relationships and eventually we brought P around to understand that calculate really means 'figure out"

"He did not know what equal means. I held up two playing cards and asked how they compare and he said "the same", so we took it from there."

"Draw 2 diagrams and 2 definitions . . . Discovered that he didn't know the word 'partial' . . . We drew a diagram of the words and discovered relationship between them. I asked him to now draw the diagram from memory (which he couldn't do before). He drew it perfectly. The definitions made sense to him as well."

"This was the first time I've felt that I helped out my group. Great Feeling!"

3.2 Adapting the Program to the Students

Some teachers learned to adapt the program to the individual needs of their students. When the teachers focused on the students' perspectives and analysed where the discrepancies lay between students' needs and the instruction, they were able to make the necessary adjustments.

"Worked with B. We are still on analysis and are so bogged down by the written vocabulary that we don't seem able to accomplish anything . . . I need to find a way other than "content specific material" to work with B."

"I will begin working with a pictorial approach that is thematic in nature and bring in the core subject as it applies to the picture."

"Decided to combine analysis and focusing related to behavioral issues which, of late, are really interfering with P's progress. We were able to eliminate those characteristics (irrelevant data) which did not impact on P's school behaviours and those that did."

"I feel that B is making progress. His workbook and how it was utilized re: focusing opened up new windows for me . . . My goal is for B to generate a final product which demonstrates his development of the relationships he created when he worked through the process."

"They got 5 out of 6 problems wrong the first time through. I pretty well had to lead them through it. Basically the activity was awful. I feel frustrated! Talked to Charles re Math activity. He suggested a pictorial approach. Tried it with M and C what a difference! The boys got 5 out of 6 correct! ... They also seemed to enjoy the activity when illustrated with pictures."

3.3 Student Metacognition

When students were made aware of the benefits of using a particular mental process, teachers found there was a positive impact on student willingness to work at developing the skill involved.

"...simply making students aware of the benefits of subvocalizing is an initial step helping them become aware and develop this skill."

"...making students aware of the benefits of representing information externally in working memory has a positive impact on their willingness to show and present their work."

"We discussed the difference between going home and memorizing something and really understanding. The advantage of breaking down the subject, labelling, and putting it back together after recognizing the relationships (between) the parts."

"A is becoming more engaged in the sessions asking questions as to why we are doing certain exercises. We discussed the importance of focusing, of being aware of and discriminating between relevant and irrelevant data."

4. TEACHERS' NEEDS

4.1 Time

Time was a big factor for these teachers who had many other pressures to deal with. For some there wasn't enough time for the program; for others there wasn't enough time for all the other things.

"I just completed making Xerox copies of report cards 1 to 6 for my 5 students . . . it took me 1 hour."

"School division has approved a substitute for Tuesday and Thursday afternoons permitting regular time slots with which to work with the designated students."

"Last Friday's session was cancelled because my student teacher was ill. Very frustrating. I'm so far behind. I'm afraid I'll never catch up."

"I think I'm going to have to work with these students one on one most of the time ... Where will I find the time? I must make it somehow."

"With absenteeism, not showing up for the session or a fear of missing the classroom instruction has forced me to reconsider when I am pulling her. I think I am going to try to pull from Art and Phys. Ed . . . I will do the same for P because . . . I don't believe he can afford to be out of the classroom for his 'core' subjects."

"Until you have enough practice, spontaneity really has little place in your efforts. You have to take time to deliberate before you meet with your students, about what you intend to accomplish and how you intend to accomplish . . . so that your time with your student is useful to them."

"As the resource person I find that I am coming up against some issues that are making my progress with the augmentation/transfer of the domains tenuous. Firstly, often, student absenteeism is a real issue. Release or lack of time is another concern . . . Many teachers are . . . requesting assistance in developing network schemata for the course content . . . Carrying the Family Life instruction . . . has also interfered with the progress. I am trying to organize... my timetable...so that a half day release time will be built into my timetable.... and that for all intent and purpose I am unreachable in that block."

"I gave all my efforts to these 5 students. But the guilt I feel for not performing my daily job as I had envisioned. The one hour daily disrupted the continuity of my own program. I didn't work with the ones I wished. I was always scrambling to get my other work done as I'm always on call for the unexpected. I guess I feel that I did not do my everyday school job to measure.

4.2 Collaboration/Support

Teachers who engaged in regular collaboration with colleagues reported this to be beneficial. A supportive staff was also seen as a positive factor.

"Our team has collaborated twice on consecutive Thursdays. This is proving very beneficial. We are able to discuss and anticipate any concerns in future clinical sessions. Also we have established the cognitive skill, appropriate augmentation activities and possible transfers to subject areas for the next week."

"Having the opportunity to dialogue and exchange examples of transfer activities has proven to be most beneficial. This workshop along with my readings...have given me much insight on how to make the transition from the perceptual to the conceptual. The afternoon session entailed going through each analysis activity to clarify the intent behind these exercises. This has helped immensely."

"Met with X to discuss how we could best take advantage of Charles' time. Decided that we would look at 'Problem-Solving' - an area that we were to look at on one of our Saturday classes, but haven't got around to - we will also bring

work we are doing with our students and discuss which directions we can best move in."

"Y and I met to develop an augmentation exercise for comparative analysis. This proved beneficial to myself in that it helped clarify the features of this dimension and better understand the considerations one needs to make in devising an augmentation exercise. A suggestion I would make is that this exercise be an instrumental part of any future training program. This would be especially useful as trainees move to the higher controls (ie beyond analysis and focusing)."

4.3 Problems/Suggestions

One of the beginning focusing questions on distance and time seemed to cause frustration for many of the teachers.

"At end of session, each agreed the difficulty initially was that the problem they were asked to solve was difficult (the distance/time question) - because of the rare case of seeing one like that. Pattern of error - could not overcome the confusing thoughts this type of problem presented. Clouded all other thinking."

Some suggestions were made for the benefit of future trainees.

"One thing that I would recommend is that, at the beginning of the training, we be given lots of concrete examples! (It took me at least 6 weeks to figure out what was going on!! I felt very frustrated!). I don't feel like that anymore. I feel encouraged both for my students and for myself. I sincerely hope the program 'flys' next year and more teachers can get involved - it's worth it!"

"The simple-complex test generally required for teachers to evaluate the student responses before we were confident of the accuracy of the score. Possibly more time could be given during the initial workshop to practice evaluating response to achieve greater individual consistency in this area."

"...it would have been beneficial to have each student begin the new year with an analysis and focusing augmentation and a relevant transfer rather than beginning with the comparative analysis. This would have been best due to their break for Xmas."

"Having the opportunity to work together (to prepare an inservice for the staff on CBIS), clarify principles and share each other's expertise was a truly rewarding professional development experience. Again, I think it has merit for the trainee in CBIS... following approximately two-thirds of the completion of the CBIS program."

5. CHANGES IN TEACHERS' BELIEFS AND PRACTICES

5.1 Use of Cognitive Skills Approach in Classroom Teaching

Two of the teachers reported transferring the CBIS approach to the classroom.

"Over the past 2 ½ months, I have networked all my Science Units. The network itself serves to clarify and help me refine the content to the focal concepts. One is able to condense the material to its key concepts and better understand the underlying relationships. Also the network serves as a mnemonic."

"In my regular classes I have begun implementing idea trees (networks). I constructed the framework for the idea tree and then had students read a unit, then fill in the empty cells. Two days later, without having asked the students to study the tree or refer back to it I informally quizzed them on reconstructing it. It was significant, the amount of detail put back into the tree, and their ease for recalling this information was impressive."

"Charles saw the results of my Grade 9 Emotion Assignment using a Concept Structure Model and Idea tree. He was impressed. I'll take some finished work to university tomorrow and discuss it."

5.2 Thoughts on Teaching/Changes in Belief

Four teachers reported a definite change in belief that would affect their future teaching. Following are some of their comments:

"Again, it was brought home to myself, the benefit of developing the analytic and focusing controls. I realized my tendency or eagerness to move to more advanced controls at the expense of these key basic ones."

"I'm at the point now (I think!!) where I feel very comfortable with what I'm doing... What's not good is I'm feeling impatient and want to move on-but I think it's important that the students really do lots of this stuff. It seems to be at the foundation of information processing."

"I have just completed observing Dr. L's working with the group. I was really interested in the... way the original problem could be... transferred... I can see

that when you teach the lesson you almost have to anticipate the functioning of the mind."

"This week in Math Club I had students explain their solutions to problems to the rest of the group. I emphasized to them to articulate their thought processes... I was reminded at this time that very often thinking is a hidden tool... Also I was amazed at how I was able to follow their moving from one cognitive skill to another as they explained their solutions. I plan to use this approach much more in class for modelling purposes and my own diagnostic purposes."

"Never have I felt so sure that some of the decisions I am making are sound and valid, and with all my educational training I was never, before this time in my career, able to say that with as much confidence."

"If I were to go back to a regular classroom, I'll never be able to teach the same way again. I will be better able to reach more children."

"If this program were to be offered again, or as a continuing program, I would definitely get involved. I believe in it-it works! I think the most telling point for me was during a class I had with all my students together. We were reviewing a newspaper article. I had asked them to find a pertinent fact and I was scanning the article to find it myself. I guess I was going about it a bit 'haphazardly', because C, who was watching me said, "Mr. Z you're doing it wrong-you're supposed to go left to right, top to bottom "and he did an exaggerated mimic of how it should be done. Seems he did learn something!"

6. CONDITIONS FOR THE SUCCESSFUL IMPLEMENTATION OF CBIS PROGRAM

Analysis of the teachers' writings revealed five key ingredients that seem to be necessary for the successful implementation of the CBIS: (1) belief and commitment, (2) hard work, (3) support of colleagues, (4) flexibility, and (5) openness to changes in beliefs about teaching.

First, it appeared to be necessary for teachers to strongly believe that this approach was worthwhile and that it would present new learning opportunities for themselves and their students. This belief formed the basis for the commitment required to spend a significant amount of mental energy and carry through a great amount of work.

Second, a lot of hard work had to be done. There was preparation to do for the one-to-one sessions with students, reading of books and articles, and attendance at Saturday workshops, all on top of a regular teaching job and family life.

Third, support, especially within the school seemed to be closely linked to a teacher's ability to clarify ideas and generate opportunity to articulate ideas, work together with colleagues on methods of implementation. Having the backing of an interested staff seemed to have the most positive outcome.

Fourth, successful teachers seemed to be flexible within the structure of the program. For example, the teacher who worked with a student who was overwhelmed by the "specific content approach" found an alternative in a "pictorial approach".

Instead of persisting in a futile direction, she found a solution and was able to continue making progress.

Lastly, something that very quickly puts teachers on the defensive is the threatening prospect that one's own teaching holds inadequacies. Those teachers who expressed a change in belief seemed to be prepared to attribute students' failure on current teaching practices and were eager to make changes.

These five ingredients were present to a larger degree in journals of teachers who indicated a feeling of success in the CBIS project, and to a lesser degree in journals of those who expressed some concerns regarding the implementation of CBIS.

DEBRIEFING INTERVIEWS

Mr. Willem Steur interviewed all teachers, principals, student teachers and students involved in the CBIS project. The section which follows outlines his findings. During the debriefing period the eleven participating teachers and four principals of the four Greater Winnipeg public junior high schools involved were interviewed individually. Four student teachers, who had practice-taught with teachers in the project were questioned by telephone. Forty-four students who had participated in the project were interviewed in ten groups varying in size from two to six students. The interviews were conducted along guidelines consisting of a series of questions A (Appendix B) developed by the University of Manitoba CBIS project team.

"This was the most valuable thing I have ever done in my fifteen years of teaching. It was trying at times, but worth it."

"Our schools are too much involved in making kids just feel good. This program finally centered on learning; on how to help a child realize his capacity to learn."

"It was a massive assignment and very time -consuming. The program just snowballed and the workload became excessive."

"This is a very viable concept. I am pleased and excited to have been part of it."

"This is encompassing teaching and its applications to classroom teaching are really powerful."

"It helped me learn better. I understand more than in the big class."

"It is wicked. I missed my friends in the big class."

"I was always told I am stupid. The group told me I was smart."

Comments made by teachers, principals and students who participated in the demonstration project Dropout Prevention through a Cognitive Based Instructional System, during the 1991-92 school year were generally positive about the program itself and its results. Some teachers were concerned with the training and program implementation. However, even those with strong negative comments about administrative aspects indicated to the interviewer that they were still glad to have been part of the project.

TEACHERS' COMMENTS

Confidence in strategies

Eight of the eleven teachers interviewed said they were not completely confident in using CBIS strategies. Of the three who were confident, one, while expressing confidence when working in a clinical (one-to-one) situation with a student, expressed the

expectation to develop more proficiency in the future. The second confidence-expressing teacher felt that once teachers have come through the training, they should be able to handle the program. The third confident teacher said the program had improved him as a teacher, by giving him better teaching strategies.

The main reason given by the eight teachers not feeling confident in using CBIS strategies was the fact that they had not received enough practice and that they would need more time to develop their skills. "There are still a lot of grey areas," was one comment. "I can do it, but it is still hit or miss," said another. A third was not quite sure what the strategies were: "I understand the theory, but I don't know if I have a true handle on it." Two of the eight felt that their progress had been impeded by other activities in the school which had made demands on their time and energy.

Change in Philosophy

Participation in the CBIS project resulted in a change in philosophy and teaching strategies for nine teachers. The two who felt their new knowledge of CBIS had not changed their basic outlook as resource teachers and that courses taken previously had already made them much more student-centered in their approach. "This just refined my basic premise," said one of them. The nine who felt that their teaching philosophy and practice had changed indicated that their perception of certain aspects had been altered. "It made me look at different ways of how we study and learn," said one.

Two others stated that they did not take things for granted the way they used to. "You can't assume kids have a certain knowledge. I teach more carefully, more systematically and I go at a pace that is reasonable and sensible." And "I now engineer

for the cognitive skills and I do a cognitive analysis before I develop content." Two other teachers of this group of nine observed that CBIS had given them a new window on the learning situation or, as one of them put it: "I look at the task students are asked to do and then I break down the curriculum in such a way that they'll understand." This last teacher admitted that, before his participation in the CBIS project, he was short on knowledge of how children learn. Another teacher said he had become more aware of the level students are at, and that he was now ready with remedial measures and he could define the concepts taught more clearly when students did not understand.

In general, the nine teachers, who said that their teaching philosophy had changed, felt that they were better able to meet the demand of their students and were much more conscious of the way they present their material.

The two teachers who answered the question about changes in their pedagogical outlook with "somewhat" indicated that they had acquired more respect for students' incomprehension: "In the past I gave a good lesson and then wondered why they did not understand". They now took the comprehension factor into account when planning a lesson.

Teaching Strategies

When discussing teaching strategies in more detail, all teachers interviewed indicated that they were now more precise, more careful and slower paced in their teaching. They all put more emphasis on breaking subject matter down in easily digestible portions and in identifying more clearly for themselves the areas where

students might have problems. Their approach had become more analytical and they strived to eliminate ambiguity from their questioning technique.

One teacher said he took more risks now by trying out different strategies. Instead of relying on the textbook he developed his own material, geared to the level at which his students were at that particular time. "I pay attention to context now, instead of being all content," was the way another put it.

By presenting subject matter more sequentially, and therefore more slowly, and by making extensive use of the blackboard, one teacher indicated that it took now twice as long to present certain subject matter. The attitude of not taking students' understanding for granted influenced the design of the lesson plan for another teacher, who now teaches information processing techniques before teaching the subject itself. "I did before, but not in the same way," he added. "I am much more careful in wording my presentation and my questioning," said one teacher, who added: "I make sure they can see the pattern of my lesson by relating one question to the next one. I help them arrive at a conclusion from their own perspective, not from mine. I understand now where they are coming from and that the way I learned something is not necessarily the best way for them."

"Automating the sub-skills," was the term used by a teacher, who described how he enabled students to deal with preliminary mechanics prior to solving the problem itself. This technique allowed him to prevent students from becoming bogged down in the sub-skills, so that they could direct their attention to the main problem, instead of giving up in the early phases.

A teacher said he was now able to get students to search inside themselves and to pinpoint their feelings before trying to express them. "This is usually hard to do for students," he added.

Assessing Learning Outcomes

Only nine of the eleven teachers interviewed were able to discuss possible changes in their evaluation methods. Two said they put less emphasis on evaluation and that they assessed learning outcomes now in a more global way. One teacher stated he had become more thorough in his testing, while another indicated that, at the end of the teaching process, a teacher usually knows whether students have understood or not.

Of the teachers who stated they had not changed the way they assess learning outcomes, one mentioned that he was flexible enough prior to his participation in the CBIS project and that he was still flexible. A second teacher said that if the appropriate software were available he might change his evaluation techniques, but for the time being he would continue to evaluate mainly by observing his students. One teacher said that because of his particular domain he had not changed his evaluation methods, but that he would do so, if he taught a regular class.

Permanent Change

The question whether they would incorporate the changes brought about by the CBIS project in their future teaching was answered with a resounding "yes" by ten of the eleven teachers interviewed. The one exception did not answer negatively; he indicated he would continue to be patient and to apply analytical techniques in the usual way.

Some of the reactions that accompanied the affirmative answers were:

"You have to continue, or your skills will fall in disuse."

"Next year I'll bring in the cognitive skill approach right at the beginning of the year."

"I am sold on CBIS."

"I'll start each future course by teaching how to process information."

One teacher indicated he would incorporate only some of the CBIS strategies, just those relating to comparative analysis, in his future teaching. Another one said he would change his teaching style "just a little bit". "I won't use many different techniques," he commented. "For me, the most important aspect in CBIS is in the approach, the philosophy of the program."

One teacher who said that the changes in his teaching strategies would be permanent, stated that although he would like to extend CBIS to the entire school, the administration would probably not buy into it. He realized the cost would be high but he was sure that in the long run it would be financially advantageous if students, by staying longer in school, could manage to keep off the welfare-rolls.

Students' Self Respect

Did the students participating in the project gain in self-respect? Five of the eleven teachers interviewed said their students had acquired more confidence. "I detected a great change," said one teacher. "They did not learn more, but I am impressed by their increase in self-concept. I encouraged them a lot because weak kids need interpersonal relationships. They would have liked more of it."

Another teacher observed that "once they saw that the program worked, they started to do things more confidently." A third teacher noticed that students in the program felt relief: "We finally get help; someone is addressing our problems."

Three of the four students with whom a fourth teacher worked showed more self-esteem and more confidence in handling the subject material. In another group of students, three showed more confidence, while two had not changed noticeably. "Kids now come to see me of their own free will," said one teacher.

Five teachers stated that their students had not changed in self-concept, or if they had done so, they found it difficult to detect. "They were not long enough in the program," was one comment. Another teacher thought there was some change, but this could be attributed to other factors as well (maturation, for example).

Students' Behaviour

Teachers were again about evenly divided in their answers to a question about improved behaviour observed in their students: five had not noticed any, or only minimal, change (possibly due to maturation), while six teachers said that students' behaviour had improved. Some of their comments include:

"They are not as negative as they used to be."

"They have become less impulsive, less ready to throw up their hands and give up on the assignment."

"They are more quiet, more organized. They think more about their future."

Students' Academic Achievement

Only three teachers stated that their students' academic achievement had improved. "They have an easier time," said one. Another teacher, who divided his students in reflective and impulsive thinkers, felt both categories had improved. The stronger students would be able to deploy their newly acquired skills in the future, without necessarily requiring individual attention, while the weaker students had reaped more immediate, short-term, benefits, but would still be in need of individual help.

Two other teachers had not noticed any improvement. One of them said it was too early to tell; the other felt one student had regressed and that he could only hope that CBIS had helped this student at least somewhat. The remaining seven teachers reported mixed results, with some students improving (sometimes only very little), some moving backwards (possibly because of personal problems) and others remaining constant. Some of their comments include:

"Three out of my four students show more confidence in the subject material and perform at a more consistent achievement level."

"The successful ones are more attentive, more careful in their writing; now they'll at least try, instead of leaving the paper blank, like before."

One teacher, musing about the fact that his students had not made much progress, said that he felt sad about it: "They only seem to improve when we continue to hold their hands," something which is clearly an impossibility in today's school setting.

Students' Attendance

There was no noticeable pattern in teachers' answers to a question about changes in students' attendance. Four teachers stated that their students had never had attendance problems in the past and that they did not have any now. Four other teachers noted that one (in one case: two) of their students had become an absence problem, while the others in the group had shown regular attendance, as in the past. These teachers attributed the increased absenteeism to factors other than the CBIS program. Only one teacher said that a student with a history of absenteeism had become a regular attender. Two teachers were unable to comment on their students` pattern of absenteeism.

Students' Attitudes Towards School

Are changes in students' attitudes towards school attributable to the CBIS program or to their maturation during the school year? One teacher raised that question, after indicating tthat two of his students became more positive about school subjects, showed more respect for teachers and were somewhat more open with their peers. Six other teachers noted that in general their students had become more positive. Some of their comments include:

"They smile more, seem happier and are more ready to accept correction."

"They have better attitudes and show better behaviour towards substitute teachers."

"They are better able to do the work. You can see the improvement in interhuman relationships."

Three teachers had not observed a change in attitude in their students. One teacher was unable to answer the question.

Students' Learning Strategies

Seven teachers had observed positive changes in their students' learning strategies. "They have learned to tackle a problem one step at the time and they have cut down on their natural impulsivity," said one. "They ask for help now instead of giving up right away," said another. A third teacher noted that his students now worked more sequentially and two other teachers stated that their students made more use of analysis. Three teachers had not noticed any change in their students' learning strategies. One teacher could not answer the question.

Students' Participation in School Activities

Two teachers commented very cautiously about changes in their students' participation in school activities. One had detected a slight change: "They seem to want to be part of things a little more." The other teacher felt that two of his students had become a little bit more involved in class, but none of these students had started to take part in extra-curricular activities: "They have always been nonparticipants." This last utterance also would be applicable to the students of the other nine teachers in the program, who either stated that they had not observed a change or said that they did not know. "They just seem happier," observed one of them.

Students' Response in General

Asked about students' responses in general, one teacher said that it was hard for his students to change tactics when not successful in solving a problem. Students wanted to correct by starting from the point where they were and they had difficulty backtracking to a point from where they could take another direction. They seemed to

resent going back to an earlier level: "They'll say: we've done it this way for the last seven years, so I ask them: and how did those last seven years go? When they finally see that there is a different way, they comment: we should have done it this way earlier on!" Another teacher observed that his students come across now as less negative: "They think now before they respond." Other comments include:

"They're happier now, more enthused, less fatalistic."

"They are more concerned about academics now and they'll come and ask for assistance."

"My kids were pretty good to begin with, so they did not change all that much."

Two teachers indicated that their students were not sure what the CBIS project was all about. Yet, they were curious to see what would happen. One group felt that this was not Special Education and that there was no stigma attached. Some were flattered: "How come they picked us?!"

One teacher noted that one student had remained difficult to the end. He described this student as an inflexible thinker, not a risk-taker, someone who hides his emotions. This teacher had persisted to the end, but found it difficult to gauge the results, if there were any at all. Three teachers had no further comments about students' responses in general.

Feedback from Parents

Parental feedback to the teachers in the program was scanty. Six teachers received no parental feedback at all. One teacher received expressions of gratitude from parents who were glad that their child received instruction on an individual basis. One

school had organized an information session about the CBIS program at the beginning of the year and one or two parents had called later on, wanting to know the results of the tests. These parents said their children loved getting the extra help.

In one case parents expressed the opinion that their child was behaving better at home. These parents asked the teacher to send home a weekly note about their child's behaviour. They, like several other parents, were sad that the program came so late in their child's school career: the children had been problems all along but nobody had ever done anything. They felt the program should have been there from Year One.

One mother told the teacher that she was happy with her child's improved performance. The child had been able to come out of a depression and not only had she improved academically, but her social behaviour and her general attitude had also changed for the better.

Relationships With Other Teachers

Teachers working in the CBIS program in the same school generally expressed the feeling that they had developed a good working relationship with each other. "We talk a lot about strategies," said one. "We three talked a lot, compared notes whenever we could. We have a lot in common now," commented another.

Other teachers on staff expressed curiosity about the program, even "sympathy" with the teachers involved because they saw that the workload was considerable. If some teachers did not express an opinion they might, according to one teacher in the program, be envious or perhaps wonder why the CBIS teachers were not doing their regular assignments.

One school stood out with regard to staff relationships. The three teachers involved with the CBIS program in that school conducted a half-day in-service on CBIS strategies for the other staff members. The presenters received a highly positive evaluation at the end of the half-day. "Teachers were really impressed," commented one of them. As a result of this in-service, relationships among the three CBIS teachers and other staff members were strengthened. One of the three stated that he felt he had acquired more credibility with staff as a resource-teacher and another one indicated that staff members during the year readily accepted the ideas he wanted to share with them.

Although other schools did not react in such a positive manner, all teachers in the CBIS program felt they were treated fairly by the rest of the staff. "At least they did not complain," commented one resource teacher who had been unable to service his regular load. In one school, CBIS teachers took some good-natured kidding about students missing classes. One teacher felt that the staff had shown solidarity, when the CBIS teachers indicated frustration with the difficulties of administering the program.

Training Workshops

Teachers' opinions were divided regarding the CBIS training received. However, even those who were most critical took great pains to indicate that they had received valuable information. Positive comments made by four teachers about the workshops include:

"Extremely stimulating. They really served my needs. The workshops provided theory as well as a certain degree of practical work, but the presentation was lacking in some practical aspects, mainly because of unfamiliarity with the content area at our teaching

level. The first workshops were vague. It took us four weeks to become familiar with the material. I went in with a lot of hope. The outcome was indeed substantial."

"We received an enormous amount of information and it took me a long time to catch on. It was very frustrating in the beginning, but after more concrete examples were provided, it finally clicked."

"They were valuable."

"They were very good. I am disappointed it stopped there. We should go on for another year and develop more finesse. Now I have just the basics."

Critical comments about the workshops made by seven teachers included:

"They were informative, but the strategy should have been demonstrated with a student right in front of us. It was too much theory.

"Some information was useful, some useless. Too much educational jargon. Examples, taken from areas not taught at the junior high school level, were not relevant to our day-to-day problems. We cannot deal with kids only cognitively; kids are people, they have personal problems, they come from single-parent homes, they are subject to moods and depression."

"The first week, the introductory part, was the best. Later we wasted time during the on-site coaching because we could not participate in the dialogue, for it was too early for us; we did not have the experience. The workshops should have been used to go through the material and in practice teaching."

"We spent a lot of time on computers at InfoTech. We needed more explanations: Why are certain questions there? What can we learn from this particular response? What

should we do if a student does this? I wanted to know: What does a certain question mean ?, rather than be told: Here it is. We learned about mechanics, but we needed better insight as to how the program is sequenced. We needed more basics.

"At the beginning whole morning sessions were taken up with sharing. But we had nothing to share; it was too early for that.

"There should have been a Francophone animator."

Training Materials

Teachers' comments on the video material ranged from excellent (three) to amateurish (one). Four teachers found the videos helpful and rated them as good. One teacher found them very tedious and forced himself to watch them. Another teacher rated them as not too helpful. He felt that it would have been more valuable to see him work with kids and watch augmentation strategies, for example.

Other comments on the video material:

"We got a handle on analysis, but there was nothing similar for the other six components."

"The material came too late. It was hard to understand. It should have been shown and discussed during the Saturday morning sessions."

"For me the video confirmed that what we were doing was correct. I learned from it; it removed my doubts."

"The material was not sequential." (This from the teacher who found the video amateurish).

"The video presented a more continuous development of the material. Contrary to the lectures, which (due to questioning from participants) went sometimes off-task, the videos were unbroken, continuous and provided for better understanding." (This from one of the teachers who had rated the material excellent).

Training Facilities

There were no complaints about the facilities. They were rated as excellent (two), fine (four) and okay (five). One teacher commented that it would have been nice to stay in one place for the duration of the course.

On-site Coaching

The comments teachers made about the on-site coaching they received ranged from wonderful to negative. Five teachers had a positive experience, four had not much good to say about the site visit and two had mixed feelings.

Positive comments included:

"The modelling was wonderful, the best. Of course, he has his own style and teachers will have to adapt his methods to fit their own teaching style.

"The feedback was useful. We had some space problems in the school so he had to work in rather cramped situations."

"The on-site coaching helped me well. He was more than willing to model a particular cognitive skill."

"The site visits by project staff were very helpful. He ended up taking over and modelled, so he did not give me the feedback I would have liked to receive."

"Project staff were very good. They were open and available. I received instant feedback, which was good. On-site coaching is a necessary component in future programs."

Comments made by those who had mixed reactions include:

"The on-site coaching was encouraging, however the expectations were too high."

"It was good to have the on-site coaching, so that we could ask him questions. The feedback was helpful.

Negative comments were:

My coach watched me as I worked with a student and gave me positive feedback, but I would have liked to see him work with a child and show me how it is done.

"I should have liked to see him demonstrate with a student and give me feedback person-to-person. I was left with an empty feeling."

"On-site coaching needs to be better organized because teachers are tied to a time table."

Learning Experience of Teachers

All teachers interviewed agreed that they were enriched by the program. Some comments were as follows:

"I hold a pre-master's in educational psychology and I have taken part in numerous summer institutes, but I have learned more from this than from any previous course."

"This is a very valuable tool. Not the end-all, just one of many others. I am glad I was part of it."

"The program is great, excellent. I will continue using it in my classes."

"Even as a resource teacher I learned an awful lot."

"This dramatically changed my teaching style and my ability to interact with students who experience difficulties. It was the most valuable professional development experience ever."

"I now know more about why some kids are weak."

"The program has enlarged my awareness of the areas where kids have problems. I learned different strategies to cope with these problems. I have adjusted my teaching to facilitate better learning."

"I have learned to pay more attention to cognitive processing. These learning ideas are not really new, but they have taught me to focus on analysis and how to do concept development."

Commentary on Outcome

Seven teachers answered in the affirmative when asked whether the outcome was worthwhile. Their comments were as follows:

"Kids are doing better and me too."

"It made me like my job better and I really got to know the students well."

"Students learned and I learned."

"For me: yes, for the kids: who knows?"

Four teachers found the outcome doubtful or difficult to measure. The first felt that more intensive work over a prolonged period of time would be needed. The second said that the program had helped him alter behaviour, but that the academic results were negligible.

The third teacher, commenting that some students had regressed (which could be, admittedly, for other reasons), wondered whether all the time and effort spent was warranted, when only one third of the students had improved. He admitted that any kind of improvement is good for the students involved, but indicated that he had expected better results.

The fourth teacher who expressed disappointment was not sure what he got out of it and felt that the results with students were doubtful at best.

Unintended Outcome

The most significant unintended outcomes of the program were:

- closer ties with colleagues in the project mentioned by two teachers.
- one teacher used newly acquired techniques on his own children and felt CBIS strategies would be very useful in a future career as principal: "I can help teachers analyse why they are having a discipline problem or why a student was turned off."
- another teacher commented that he had learned to be more careful in the way he writes and presents material.
- The most delightful unintended outcome of the program was a successful professional show at a Winnipeg art gallery, where several Junior High School students sold some of their art work. The CBIS approach is now also integrated in the Senior-I art curriculum for Manitoba High Schools.

Positive and Negative Aspects

When asked to name the two most positive and the two most negative aspects of CBIS, the following comments were made.

Positive comments included:

"CBIS gave me a valuable tool."

"It opened up new strategies for me and changed certain things in the way I am teaching."

"The material was very good and well-developed."

"Finally we got something on learning. Our schools are too much involved in making kids just feel good. In this program a child can realize his capacity to learn."

"It gave me a new perspective on how students learn and how they process information."

"It gave students new tools to learn."

"It enriched me professionally."

"I acquired new expertise which gave me confidence and a better understanding of the learning process."

"I have learned to identify more easily the students with learning difficulties."

"I enjoy research and this was an opportunity to be part of ongoing research."

"I learned patience and how to pace myself when working with children."

"Once you have these skills, your performance in academics and in life in general will be positively affected."

"It was rewarding to see a student gain confidence and change his attitude towards academics."

"I have become better at backtracking to discover where a particular problem is located."

"It works! It is fascinating!"

Negative comments were as follows:

"More funding is needed to make the program run smoothly in the schools."

"We need the full support of the administration; otherwise a program like this will die."

"The project was incredibly time-consuming. It requires initiative and hard work; it is not for people who are not fully committed."

"A teacher cannot carry a full-time teaching load and be a clinician at the same time. We three teachers in the project worked together, but we felt isolated; there was no sense of a joint effort."

"The project was not structured rigorously."

"The training sessions were over our heads. Complex topics should have been brought down to the level of the Junior High School teacher."

"It was a massive and time-consuming assignment. The program just snowballs on you. I did a lot of extra reading, but the workload was excessive to begin with. Not enough time was given to carry out the clinical augmentation properly. Participation in this program requires a leap of faith in the value of the program early on; otherwise you can't live up the commitment."

"The huge time commitment made me frustrated and angry at the beginning, but in the end it was worth it."

"The program is good, but a teacher must really want to do it. In the present-day school framework a program like this is difficult to organize and implement."

"The training was inadequate."

"The time factor. It was hard to free students for training sessions. Putting a student-teacher in charge of the class is not really a solution: this person still needs help and has a right to feedback, so it causes just more work for me."

Levels Covered and Students' Abilities

The following is a breakdown of the number of cognitive profile levels covered by students in the program and teachers' remarks about their confidence in the augmentation and transferring abilities of their students.

Three levels covered (three groups of students):

"They made some progress, especially in analysis and focusing."

"We did the first two in depth and started the third. Students made progress in the first two levels."

"Students don't feel confident yet. They need more time."

Four levels covered (five groups):

"Students have more skills than they started out with, but they have not mastered them."

"I do not feel confident about their skills. They need more practice."

"Students are able to implement what they were taught. I do not feel very confident about my own skills: I am mediocre, I am a C, I had nobody to converse with."

"I am more confident with regard to some students than to others. They need a lot more clinical work, but they appreciate what they get. A 40-minute period is too short for CBIS."

"The skills involved should really be second nature to students and there was not enough time to get to that stage. They cannot work with it on their own; they still need a lot of structure and coaching. Give it another year."

Six levels covered (one group):

"I spent only three sessions on each of the last two or three skills. We spent most time on analysis and focusing, but as the end of the project came near, I moved them through the other levels to see how it worked and to learn about them myself. Students are more careful now. They take time to think. They use what they learned before. Some students regressed or remained at the same level, but that could be for any reason."

Seven levels covered (two groups):

"Students mastered only two or three levels, but they were exposed to all seven. I rushed them a bit but I wanted to work through all seven levels for myself. I am not sure that students could work by themselves and apply their skills to new material. They always worked under my guidance, in a one-to-one situation."

"We went through all seven levels, both in the clinical and in the classroom situation. I feel confident in the abilities of my four students in the clinical sessions. I could not get that far with the large group, as preparation time was insufficient. I received the information only by bits and pieces, which made it hard for me to develop a systematical approach with the large group. But next year I will be ready."

Cognitive Profile Test

Opinion on the computerized cognitive profile test was divided. Only three teachers indicated that the test was useful or interesting. The others were non-commital.

One teacher who found the results interesting felt that a preliminary explanation of the test should establish more confidence in the results. All three teachers who reacted positively to the test indicated that the test results only confirmed their personal assessment of the students.

One teacher who stated that the test results were inconclusive said that, at the beginning, strange results were obtained. A student who had been in Special Education all his life tested out as a Type One. Other students who might have been Type One all along, tested as Type Two.

Other comments indicating reservations about the test included:

"It's just another method of determining how children think. There are flaws."

"Students found it difficult to alternate use of paper and keyboard."

"Kids enjoyed it, but at times I did not understand myself how the test items worked (optical illusion, for example)."

"The test just gives a profile, it's just another strategy, another tool. It indicates to the teacher what is needed for remedial, but it should not be the sole determining factor."

"Test was interesting, but we need more training as to how to deal with responses likely to occur and how best to evaluate those."

"Not too happy with the test. It has a few glitches. There was supposed to be a new one, but it never showed up."

Augmentation Material

The augmentation material came in for some criticisms. Even the six teachers who rated it as good and basically helpful, felt it needed improvement. Comments made by teachers who reacted positively were as follows:

"Difficult to see how it ties into classroom work, but the more I worked with it, the better I got."

"A good starting place, but you can't use the book solely. You should bring in the kids' tests, their reading material and their regular school work as well and also develop your own material. The book is not appropriate for Senior High."

"The material is good, but some diagrams lack precision. There is a lack of explanations."

"The writing is amateurish, but it has merits and I found the content useful."

"It looks easy, but it is time-consuming and requires a lot of effort. The Teachers' Manual should have had the answers. The material was too easy for the students."

Comments made by the five teachers who condemned the augmentation material:

"It needs rewriting. Student assignments are open to different interpretations and need to be reworded and firmed up. Objectives should be stated more clearly."

"Directions were unclear. Material was not refined."

"Instructions were often unclear and contradictory."

"Parts of the material were immature in their presentation, others were adequate. Some items seemed to be a little elementary. Pages were not always a clear copy."

"Material was not easily accessible. I was forced to jump back and forth and hunt all over. It needs refining. I hope it will improve."

CBIS As Part of Teacher Training

All teachers interviewed agreed that it would be a good idea to offer CBIS training in the undergraduate program at the Faculty of Education, University of Manitoba, but most were hesitant to make it a required course. One teacher suggested CBIS strategies could be built into the Foundations of Reading course and that this latter course should be compulsory. Two teachers felt CBIS should be offered as part of a course along with other models: "future teachers need a perspective on a lot of different things."

Another teacher felt that any special training to identify weak students would be beneficial to aspiring teachers. This would not necessarily be CBIS training for, in view of financial considerations, it would be unrealistic to anticipate that schools would implement the program. "It might make future teachers more responsive to student needs," this teacher said.

The five teachers who would consider making CBIS training compulsory commented:

"Training in learning styles is useful, especially for elementary and junior high teachers. They'll be better equipped."

"More and more students enter Junior High School with low reading levels. Teachers should be ready to receive them."

"Many of the CBIS strategies would be beneficial and useful to elementary school teachers. Their use of these strategies would act in a preventive manner and reduce

problems in Junior High. Perhaps a longitudinal study of elementary schoolchildren's achievement would be advisable."

"The course should be compulsory, but only if it is taught by someone who can put it across."

University Credits as Incentive

Teachers who participated in the CBIS project received six credits at the Faculty of Education. Asked if this had been an incentive, only three answered affirmatively. One teacher needed the credit; one felt it stimulated him to take further courses in this particular area; and one teacher said that he did not need the credit now, but that it might be useful to him in the future. Three teachers said it had not mattered to them, one way or the other. One said: "It helped me finish my post baccalaureate program, but those six credits were not an incentive; they were not the reason I participated." Another one commented that it was an added incentive: "It was appreciated. I had use for it, but it was not what decided me to participate." Those who indicated that the six credits offered had not been an incentive commented:

"I did not need them. I did not go in it for that reason."

"I participated in the program to help kids. I was going back to school anyway. Those six credits were just a bonus."

"I was interested in the CBIS concept. I felt it would be beneficial to the students and to myself. That was reward enough."

Faculty and Schools

Nine teachers of the eleven interviewed would welcome future endeavours in school-based programs by the Faculty of Education, University of Manitoba. Two teachers expressed some concerns regarding the implementation of the CBIS project:

"Those programs would have to be extremely practical and adaptable to the school's and teachers' time schedules."

Comments made by the nine other teachers indicated that they would welcome Faculty staff with open arms:

"The CBIS team has been super. They were a valuable resource. I always wondered why the Faculty was not more active in our schools."

"There is too big a gap between the Faculty and the schools. The CBIS project has helped its team members to become better informed as to what happens in the schools."

"A lot of teaching at the Faculty is based on theory. Professors are not aware of what modern kids are like."

"It would do the Faculty a world of good. They'll learn what the real world is like."

"Faculty involvement would give a stamp of approval to innovative projects."

"There has to be more of a partnership between the Faculty and teachers. We also need a link to industry."

"The more the better. Interaction will be advantageous to teachers as well as Faculty."

Final Comments

Invited at the conclusion of the interview to make some final comment six teachers reacted positively:

"In my fifteen years of teaching, this was the most valuable thing I have ever done. It was trying at times, but worth it. At the end kids corrected me when I asked questions about a newspaper article and hopped all over the place. They told me I was not supposed to do it that way, I had to go from left to right, from top to bottom. I hope the program flies next year."

"I am pleased and excited to have been part of it. I regret that we are now left to carry on by ourselves. CBIS is a very viable concept and the time has come to implement it and to find the funding and the time and the energy necessary for its implementation."

"Very good concept, but there are bugs to be worked out. I realize it was a pilot."

"I shall go on with it, using the clinical approach, if possible. The more I do the better I get at it. Time is a limiting factor, however."

"It was a good program. It needs more focus and more concrete examples in the manual. It is hard and time-consuming to make up examples in one's own subject."

Six teachers expanding on earlier criticisms pointed out that the program was very demanding on their time and energy:

"It was a difficult year for us."

"It was difficult to remain involved to the end. The use of substitute teachers upset my routine."

"I am disappointed."

"You cannot be a teacher and a clinician at the same time."

PRINCIPALS' COMMENTS

School Characteristics

It was clear from the principals' descriptions of school population, philosophy and culture that the CBIS project was run in schools with widely divergent characteristics. One school had a strong academic stream with a wide variety of programs, although there were a number of students from needy families. The school ran some special programs, which ranged from enrichment at one end of the scale to an alternative program at the other. The principal indicated the school focused on the best delivery of programs to serve the academic, social and emotional needs of the students. He said there was good student leadership.

A second principal said his school was located in a community of strivers, who were just buying their first homes. In recent years, low-cost housing programs had brought in a fringe population with many single parents suffering from the results of rough economic times. The combination of these factors made for a less academically oriented student population.

The third school served a multicultural population. The principal estimated that about 75% of the students ranged from gifted to average, with the remaining 25% being below average. Of this last category about 10% was in need of special help. The school's mission statement called for the development of students' intellectual, emotional, social and physical capabilities in an environment conducive to learning and developing awareness and respect of cultural differences.

The principal of the fourth school described his institution as serving a homogeneous community, whose members shared similar values. Students did not suffer from socioeconomic or academic problems (there was only one Type 3 student in the CBIS program) and received a lot of support at home as well as at school. This principal said he and his staff tried to create a climate where students would feel at ease and learn to appreciate the importance of learning and be willing to put in the required effort. The school, in turn, would do everything to help its students.

Benefits

Principals of the four schools involved in the CBIS project were positive, albeit cautious, in their reaction to the question whether their schools' participation had been beneficial to the students involved. They based their answers on feedback received from teachers and said that students had benefited, but they were unable to go into details. One principal, however, who had seen the work of one student after four months in the program, expressed amazement at the progress this child had made.

The fact that students in the program were pulled out of regular classes was not considered to be a serious problem. One principal added that this type of student, usually disruptive and inattentive, was not learning anything in class anyway, so that he did not miss much by being pulled out of the class.

All four principals agreed that the participation in the CBIS project had been a good experience for the teachers involved. One principal felt that the teachers had learned more than the students. Another principal was of the opinion that the different techniques acquired by the teachers could be applied to different areas and a third principal found the

program especially useful to resource teachers, who obtained an additional pipeline to students with learning difficulties. "When my most skeptical teacher became enthused, my ears pricked up," said the fourth principal, who indicated that the three participating teachers in his school had grown professionally in terms of their awareness and analysis of problem students.

Benefits of the CBIS project to the entire school did not seem obvious to the four principals. One said he saw no short-term benefits or serious impact; only a continuation of the program over the long term could bring this about. More awareness and readiness by staff to explore new avenues were seen as the most important benefit. As one principal pointed out: "It did not spread significantly beyond the three participating teachers, but I would have no difficulty in finding another three teachers willing to participate."

Even the principal of the school that organized a half-day in-service on CBIS said it was hard for nonparticipating teachers to get a grasp of the program: "It will only be beneficial to you when you start doing it yourself." In the opinion of this principal, educators in general are becoming more attuned to children's needs. He was convinced that "the habit of thinking about your thinking" would eventually find its way into teaching methods.

Implementation

"Anything enhancing our knowledge of problem students is useful," was the careful statement made by one principal when asked whether he felt that the CBIS project had been successfully implemented.

"This was only a trial run; next year we will know what to do," declared another principal, who said that, aside from some personality clashes, everything had been all right.

"It was labour-intensive, it took more time and planning than we had anticipated, but there was a pay off," commented a third principal.

This was also the opinion of the fourth principal, who complained that too many things had to be done at the same time, but nevertheless teachers had started to think about aspects of teaching previously neglected, such as awareness of cognitive processes.

Other comments included:

"Teachers still need more training."

"Teachers were not aware until the first week of in-service that they had to give up their Saturdays."

"The time frame for the lead-up was too short. The reward system for the teachers was a problem in that it was not a real incentive."

Administrative and Staff Support

All four principals indicated they had given the CBIS project full administrative support. Their comments were as follows:

"We are always looking for better ways to get through to our kids."

"We were convinced of the benefits of the project. The school division supported it as well."

"When staff was presented with the proposal, they thought it was useful. I was always on top of what was happening."

Principals indicated staff had also been supportive of and interested in the project. They did not object to students being pulled out of class. One principal, who stated that the program had been limited to Grades Seven and Eight, was not sure that teachers in Grades One to Six in his school had felt an effect.

Staff Relations

Principals agreed that relationships among the participating teachers had been strengthened. One principal said that the three teachers in the project were respected staff members who had a lot of credibility among staff and who, therefore, were able to educate their peers. The other three principals felt that staff relations had not changed noticeably.

Feedback from Parents

Principals did not receive feedback from parents. One principal had explained the intentions of the program at a meeting with parents of students involved at the beginning of the school year and one other administrator had received one positive inquiry about next year's program.

Collaboration with Faculty

Only one principal reacted in an unreserved and positive manner to a question about ongoing contact and collaboration with the Faculty of Education. He said that he had been glad to see the initiative and that Faculty members would be welcome in the

building at any time. He pointed out, however, that although he and his staff were reptive, there are only so many projects a school can handle.

Two principals said they liked the idea of a partnership with the University. It would bring the Faculty closer to the classroom, said one of them, adding however that he felt the Faculty was not really there for the school: "We are doing them a favour." This principal said he would judge each proposal on its merits and he indicated that he would welcome a continuation of the CBIS project. The other principal in favour of a partnership expressed the opinion that the University primarily served its own priorities and that University personnel expected the school to work to their timetable. Yet he felt that collaboration would be mutually beneficial and he stressed the need for the Faculty to maintain a vital link with schools: "They can't work in a vacuum."

One principal voiced outright skepticism about collaboration with the Faculty: "It is often a one-way street. If it is something they want, you get support. If you want help and it is not in their interest, forget it." (*This administrator stressed that his remarks should not be considered a reflection on members of the CBIS team and the CBIS project*).

Final Comments

Three of the four principals interviewed chose to make some final comments. One principal was positive regarding the impact of the CBIS program on the students involved. It also gave the three participating teachers new insights. He expressed the hope that the project would continue for another year: "This is encompassing teaching and its applications to classroom teaching are really powerful."

The second principal saw CBIS as a good program in a clinical situation, but he felt that pulling students out of the classroom created problems. He would prefer to see the program applied to classroom situations. The third principal said he had appreciated the openness of the CBIS team members.

STUDENT TEACHERS' COMMENTS

Merits and Faults

Four student teachers spent extended time with four of the teachers in the CBIS project. They all saw merits in the program, such as the possibility to integrate subject matter, the emphasis on learning skills rather than on the subject taught, the child-centered approach and the individual attention students were receiving.

Among its faults they mentioned problems the schools experienced with timetabling and the fact that individual coaching requires more teacher time than classroom teaching. One student teacher observed that, once students had mastered the techniques, the program could be used with larger groups at the high school level.

A second student teacher commented on the fact that he had been taught at Faculty never to divorce skills from content and that CBIS strategies contradicted this approach. This aspiring teacher had found it difficult to understand what was going on, but the reading course for secondary students, taken at Faculty, had helped him grasp the concept, since CBIS philosophy was already part of this course.

The third student teacher felt CBIS was, at present, just a project. According to him, it would have to be extended to many more students in order to become effective.

The fourth student teacher had no criticism: "It should work as long as the teacher is well organized."

Impact on Training and Career

All four student teachers interviewed felt that their participation in the project had a positive impact on their own preparation as a teacher.

> "It gave me new ideas, I started doing things differently," said one. This teacher used an idea tree and a concept map in a Grade Seven science class, instead of following the note-taking approach. When he was sure the students had understood, he gave them a homework assignment, which students handled really well: "I was amazed at what they came back with," he commented.

A second student teacher felt that his exposure to CBIS had enriched the training he received at the University. "I discovered helpful things I had not picked up at Faculty," he said.

The third student teacher said he had developed a deeper understanding of students' learning problems and that he, as a teacher, would have to plan his lessons carefully and deliberately. He intended to detect, in advance, parts where students could experience difficulty and would, in this manner, anticipate problems he might encounter during teaching.

The fourth student teacher, a person who planned to be a resource teacher, stated that the CBIS experience had confirmed for him the way he wanted to teach: "It proved to me that I am on the right track and it has strengthened my decision to go into resource."

Three student teachers felt that their participation in the CBIS program had reinforced earlier career decisions. "I have always leant towards individual learning," said one, who now plans to use CBIS strategies when teaching larger classes. "I may start every unit with an idea tree; it may be hard in Maths, but I'll try to work something out," declared this future teacher of Mathematics.

A second student teacher felt he had become more versatile and more flexible in his teaching and that for this reason more avenues would be open to him as far as employment was concerned. The third stated that his participation in the CBIS project had strengthened an earlier decision to become a resource teacher. One student teacher indicated that his participation in the project had no impact on his career plans.

Relationship with Cooperating Teacher

Three student teachers felt that their participation in the CBIS project had a positive effect on their professional relationship with their cooperating teacher. The fourth said there had been no change in the relationship: "I have always worked well with my cooperating teacher."

Comments of those who felt the relationship had been strengthened include:

"X was terrific to work with. I enjoyed the longer time period with students."

"I worked closer with him than I ever did with anyone before. We bounced ideas off each other and there was a lot of interaction."

"He helped me discover all sorts of new things, like how to develop students' feelings through art. There is more to teaching than just the subject."

Final Comments

In summing up their experience with CBIS the four student teachers interviewed commented:

"Usually there is a big rift between theory and practice. It was interesting to see a theory actually being implemented. There is, after all, a common bond between theory and practice and I saw it at work. I am glad I was involved."

"CBIS is promising, as long as the interaction among all participants continues."

"I just took care of the class. I did not do any augmenting."

"I hope the program continues."

STUDENTS COMMENTS

Missing Class

When interviewed students indicated that generally they did not mind missing classes in subjects they did not like or taught by teachers they disliked, but that they resented being pulled out of classes dealing with their favourite subject or taught by teachers they liked.

Several found catching up with material missed in class was an additional burden. One student pointed out that missing one class disturbed the continuity of the learning process; coming back to a topic after a missed class, he had difficulty understanding.

One-to-one Sessions

Most students felt they had gained from the small group or the one-to-one sessions with their teacher. In general, this gain compensated for what they missed in

regular class (except when this regular class was their favourite subject or with a well-liked teacher: see above!). Among the reasons given were:

"It helped me to learn better."

"We figured out the answers together."

"In the big class you can't get any work done. Too many distractions."

"I would like school te be small group all the time."

"It was good because you had to work really hard."

"You don't waste time this way."

"The teacher explains things for you, he corrects, he helps."

"You develop a better relationship with your teacher."

"The teacher pays more attention to you."

"The teacher watches me work and he explains where I went wrong."

"I understand more than in the big class."

"Difficult subjects, like maths, became easier."

"You can concentrate more. There were not so many people around. I loved it."

"In the large class a teacher has difficulty in paying attention to individual students."

"It helped, because it broke the work up in fragments."

"The teacher helped me with my regular subjects."

"Little-by-little is easier to learn."

A few students commented about the negative aspects of small-group or one-to-one coaching:

"It is wicked. I missed my friends in the big class."

"I'd rather be in a large group, where I can loosen up and not be isolated from my friends. I have more fun in the whole class."

"Large group is better, for there I don't have to talk."

"It was okay but I hated the teachers looking over my shoulder every moment. In class you can get away with a lot more!"

"In regular class you sometimes learn nothing. You know the stuff already or the teacher is doing a review."

"I liked the small group, but I was nervous when these University people came in to observe."

Attitude Towards School

About half of the students interviewed indicated they liked school better than before the CBIS training. For one school had become more interesting. Another still did not like school but thought it was better than staying home.

Some positive comments include:

"Before I could not care less, I felt unwanted. After this I am tempted to work" (this was said with ironic overtones); "I feel much more smarter."

"I was always told I am stupid. The group told me I was smart."

"Project made things a lot easier. I am feeling like a new man. The teacher gives us Grade Ten/Eleven work (This Grade Nine student seemed to be very proud of himself).

A student who felt he had not changed much, said that he found

school still really boring: "Teachers should be more easy-going. We should have a bit of fun sometimes." Other students who indicated their attitude had not changed said they had always felt good about school. All students interviewed indicated that they intended to finish high school, one student making the stipulation: "If I can keep up my marks."

Several students admitted liking teachers a little bit better than before, although most indicated it depended on their view of teachers individually: some they liked and others they disliked. One student admitted not liking teachers who answered their own questions: "I want to find the answers myself."

Other positive comments included:

"I like them better than last year. This year is more interesting than last year." (a Grade Seven student).

"I have been nicer to teachers, especially to the teacher who worked with us in the group."

"I have been more appreciative of teachers this year, but it could also be because I am getting older."

"Some I like, some I don't."

Some negative comments included:

"I hate all teachers, except X ." (The small group teacher). "I have known him since Grade Seven, but this year (in Grade Nine) I got to know him better through this program and I like him a lot."

"I hate all teachers. They may be doing the best they can, but they do it the wrong way. They tell us we are smart, saying: "come on, you can do this", but the truth is that we are not smart and saying things like that does not help at all."

"They are the same. One got meaner."

"I feel worse about them. I never liked them."

"From this teacher you learn something and he's doing his best."

Academic Performance

Many students felt that their overall academic performance had improved. The others thought they had stayed the same. It all depended on the subject: in some they had gone down, in others up. Some comments include:

"I did better all the way. Last year I had to go to Summer School, but this year I am passing and I'll have my summer for myself" (a Grade Nine student).

"I am doing better because I feel more motivated. It may be because of the one-to-one sessions but I am also getting older."

"I went down in maths because I missed a lot of math classes when I went to the small group session."

"I'll do about the same. In some subjects I'll fail. The project did not make that much difference."

"Some marks went up, some went down. I don't know if this project helped any."

"I went up in science because he" (the small group instructor) "is my science teacher."

"It's easier now. I understand the teacher's questions better."

Learning Strategies

Students were almost unanimous in their opinion that they were now better able to cope with their school work. Only four of the 44 students participating in the group interviews admitted that they still did not know how to go about their studies and one said that he had not detected any change because he had good learning habits all along. Comments by those who felt in better control include:

"I understand better. I don't give up so easily anymore."

"The teacher gave us good tips about how to tackle a problem."

"It depends on the subject. I handle Maths and Science better now."

"I bring the assignment in a sharper focus."

"We tell each other to shut up, so that we can concentrate. We actually help each other concentrate."

"It's become easier."

"I have more control. I do better in Maths and Science now."

"I do my work a lot faster."

"I hate reading, but I go slower now." (This Grade Seven student seemed to have learned that one sometimes has to slow down the reading tempo in order to digest the information properly).

"We have better tools now to tackle the work."

Self-concept

Most students (33) admitted they felt better about themselves because of the project. A few (eight) felt they had not changed, mainly because they always felt good

about themselves and three were not sure. Comments of students who thought they had better self-concept were:

"Because I can do some things better now."

"Because I am passing."

"Big change. I am more positive now."

"It helped me improve my subject matter."

"My work is not going to waste."

"Perfect!"

Two Grade Nine students who felt they had not really changed, said that they had acquired more knowledge, but that it had not necessarily improved their thinking abilities. "I am not smarter now than I was before," said one.

Final Comments

Asked to list the good things and the bad things about the CBIS project, the groups came up with the following positive aspects:

"It helps you understand subjects."

"It helps you a lot on tests."

"It made me learn better."

"It improves your thinking."

"I understand questions better."

"It's easier to do the work."

"It improved some of my work."

"I felt special."

"There was a good group spirit."

"Bonding within the group and with the teacher. He helped me a lot with science."

"I feel more confident. I can do things. I hated X (the teacher) at first, but later on I liked him."

"I learn better."

"I liked everything. There was nothing bad about it."

"Subjects were better explained to me."

"We acquired learning skills."

"It pulled my marks up."

Among the negative aspects, students rated number one missing classes and the necessity to catch up. Other comments include:

"The work was boring."

"Kids told me that I was dumb because I had to go in the small group."

"Sometimes we were asked very stupid things."

"Some of the things we had to do belong back in Grade Three. Grade Two even. Such easy stuff!" (Two Grade Nine students seemed insulted).

"The comparison exercises were very boring."

"The one-to-one sessions were boring. They lasted too long." (A double period in this school).

"Getting homework."

"Some sheets were very hard. We needed help in Social Studies and Language Arts. We should have practised that instead. If we had worked on our majors, we

could be in a 01 or perhaps even in a 00 class instead of 04. That way the program would be more effective. (A group of Grade Nine students).

Perhaps one student (grade nine) best summarized the dilemma of the human conditions which necessitates projects like CBIS and all the work it involves:

"Why are we not all born smart?"

The awareness that the CBIS intervention can help to improve human condition has led some school teachers and administrators to plan new initiatives that will ascertain the sustainability of cognitive-based learning in school. Project proposals describing these initiatives can be found in Appendix C. Two teachers from the Fort Garry School Division are currently running a Cognitive Based Learning Clinic for students experiencing learning difficulties. This project is funded by the school division and supported by the school. These two teachers are also being invited to give workshops on cognitive-based learning in other school divisions.

So far the efforts of school reform and school improvement have focused on conditions of learning that are external to the learners. While many of these initiatives have merits, their potential for improving students' performance is limited. Effective approaches for improving teaching and learning address the conditions of learning that are internal to the learners. These approaches have high potential for improving performance and CBIS is one of them. The interest in cognitive-based learning is growing and many other cognitive-based learning initiatives and cognitive learning centres have been established across the country.

DISCUSSION AND RECOMMENDATIONS

Discussion

Results of this study showed a discrepancy between the dropout prediction test and teachers' perception of students who are at risk of dropping out of school. While all of the forty-four students involved in the treatment group were identified as at-risk of dropping out by their respective teachers, only eight of these students met the cutoff level criterion on the dropout prediction scale. This finding suggests that in attempting to identify at-risk students one should triangulate all available indicators from various sources, including teachers reports.

Although all the CBIS students were pretested and classified as Type 1, 2 and 3 on each of the seven cognitive controls before the intervention, this information was not used to determine their needs for cognitive augmentation. In order to be classified as Type one, a student had to be also classified as Type 1 in at least 4 out of the 7 cognitive controls. Since students were subjected to augmentation and transfer training, irrespective of their specific cognitive control type, many students, who were already Type 1 on some cognitive controls, were spending time attempting to improve their ability on these controls. The validity of this approach must be seriously questioned given that time appears to be a scarce commodity and an important issue for the CBIS program. Given the potential for improving the ability of a student who is already a Type 1 on a specific cognitive control is limited, augmentation and transfer strategies should focus on deficiencies in cognitive controls where the potential for improvement is greatest.

Results showed marked differences in cognitive control change from pre to posttest. While there was an important gain in the number of Type 1 students, sharpener (29%), analytical (21%) and reflective (20%), there was little movement to Type one on focusing (4%), complex (4%) and no positive gain on narrow and tolerance. These results may suggest that some cognitive controls have a greater potential for improvement. Consequently, in attempting to help Type 2 and 3 students to move to a Type 1 profile, the augmentation and transfer training should focus on the cognitive controls having the highest potential for improvement. This finding has important implications for the cost-effectiveness of CBIS intervention. However, it should be interpreted with caution because it does not take into account the time on task factor--amount of training time spent on individual cognitive control. The analysis of CBIS teachers' journals and the debriefing interviews indicated that very few teachers had sufficient time to provide the augmentation and transfer training to their group on all seven cognitive controls. Three of these teachers indicated that they covered only three dimensions, namely: analytical, complex and focus. They "did the first two in depth and started the third one. Students made progress in the first two levels." One teacher added, " students don't feel confident yet. They need more time."

Five teachers indicated that they worked on four cognitive controls. They pointed out that some students could more easily implement the strategies they were taught. These teachers also believed that students need more practice to feel confident in the domains covered. "I am more confident with regard to some students than to others. They need a lot more clinical work, but they appreciate what they get. A 40-minute

period is too short for CBIS". Another teacher further explained that "They [students] cannot work with it on their own; they still need a lot of structure and coaching. Give it another year". One of the teachers admitted that he himself needs more practice "Students are able to implement what they were taught. I do not feel very confident about my own skills."

One teacher reported augmentation and transfer training performed on six dimensions, with varying emphasis on each: "I spent only three sessions on each of the last two or three skills. We spent most time on analysis and focusing, but as the end of the project came near, I moved them through the other levels to see how it worked and to learn about them myself. Students are more careful now. They take time to think. They use what they learned before."

Two teachers covered all seven cognitive controls. One summarized the experience in the following terms: "Students mastered only two or three levels, but they were exposed to all seven. I rushed them a bit but I wanted to work through all seven levels for myself. I am not sure that students could work by themselves and apply their skills to new material. They always worked under my guidance, in a one-to-one situation."

It is important to note that teachers who expressed commitment to the CBIS and confidence in their skills completed the augmentation training on six to seven cognitive controls and reported important gains in their students' academic achievement. This finding confirms the premise that well trained teachers can unleash the power of the CBIS to produce significant learning gains among students.

While none of the treatment group students were classified as Type 1 on the pretest, 35% of these students had a Type 1 profile for the cognitive control analytical on the pretest. This finding is of significance given that 35% of performance in school work can be explained by the well developed analytical skills. Moreover, many of these students had highly developed focusing (49%) and reflective (29%) skills as measured by the pretest. Although CBIS teachers spent most training time on analytical and focusing, there was a movement to Type 1 of only 21% on analytical and 4% on focusing. This finding raised important questions regarding the implementation of the CBIS program: (1) are all the cognitive controls of equal importance for academic performance? (2) is the relative importance of the 7 cognitive controls subject-matter specific? (3) in what order should the augmentation and transfer of the 7 cognitive controls be carried out? and (4) are some of the cognitive controls more difficult to modify than others?

Results of this study contradict earlier beliefs that cognitive skills can not be easily modified and they persist over time. However, the results support recent findings which demonstrate that students' cognitive controls can be augmented through structured training. The data indicates that 38% of the CBIS students experienced a positive change in overall cognitive profile type; 20% of the students moved from Type 2 to 1, 3% moved from Type 3 to 1, and 16% moved from Type 3 to 2. This positive result is somewhat diminished by the high percentage of students who did not register an overall change in profile designation. However, this latter result is not unexpected because the positive changes reported for each individual cognitive controls are only part of the overall students' cognitive profile. Consequently, while students can change positively in one or

more individual cognitive controls, the overall cognitive profile type will not change unless they are registered as Type 1 on at least four out of the seven cognitive controls.

The success of the CBIS project rests on teachers' ability to perform the augmentation and transfer training. Therefore, interpretation of the results must take into consideration the teachers' confidence in their augmentation and transfer skills. Three teachers indicated that they were confident in using the cognitive based instructional system in a clinical setting following the training they had received and expected to become more proficient with time and practice. The remaining eight teachers indicated that they needed more time and practice in using the cognitive based instructional system before they could feel completely confident: "I understand the theory, but I don't know if I have a true handle on it. " and "There are still a lot of grey areas" are among the comments made by these teachers. Two teachers also indicated that their involvement in school activities reduced the time and energy they needed to become more proficient in using CBIS.

The above analyses suggest that two factors have had considerable impact on the overall results of this project: teacher readiness and time. Previous studies employing outside agents to deliver cognitive augmentation and transfer have reported dramatic results in achievement. In this project teachers were given a primary role in the learning skills' enhancement process; and this, at the risk of obtaining less dramatic positive change. The major assumption underpinning this project was that teachers are the major change agents in school improvement efforts and that sustainable change can occur only when teachers are fully involved in the process. In fact this is the first attempt made to

prepare classroom teachers to perform augmentation and transfer strategies using the CBIS model. The extension of the CBIS, that is now being undertaken by the CBIS teachers at the Acadia Junior High School, confirmed that this assumption was correct.

Time also appeared to have affected the results of this project negatively. Feedback obtained from teachers made it obvious that not enough time was allocated for training. In retrospect the first year of project implementation should have been devoted essentially to teacher training. This would have met teachers' demands for more training time, demonstration and more practice in simulated settings. Teachers also believed that there was not sufficient time to prepare and to administer the augmentation and transfer training. Release time provided by some school administrators was not perceived as being very helpful by many teachers as they still needed to do all the planning for substitute teachers. Similarly, while some teachers found the participation of student teachers in this project beneficial, others felt that this created additional demands on their time. Teachers found it very difficult to carry a full teaching load and be a clinician at the same time. One teacher noted: "it was a massive and time-consuming assignment. The program snowballed on you. I did a lot of extra reading, but the workload was excessive to begin with." Under the funding agreement the CBIS teachers worked with five at-risk students. The findings indicated that this number was excessive - given the teachers' workload, the training time, and the learning curve to master CBIS strategy. It would have been more appropriate to assign only two at-risk students to each CBIS teacher. These findings confirmed the basic premise of the CBIS program: given sufficient

resources, appropriate training and sufficient time, teachers can make significant and positive improvement in their students cognitive skills.

Results also indicated that 7% of the CBIS students experienced a negative change--moving from Type 2 to 3. The magnitude of the negative change was higher on the cognitive controls complex, sharpener, focus, broad and tolerance. Further analysis of the overall quantitative and qualitative data bases is necessary in order to explain these unexpected results.

Results indicated no significant gain in academic achievement, attitude toward school or self-esteem for the CBIS group as a whole, although there was individual improvement. These results could be expected, given the magnitude of the registered improvement in cognitive profile type. Furthermore, during the debriefing interviews, the majority of CBIS teachers felt that there was no dramatic improvement in academic achievement. At the same time many teachers also believed that the CBIS students had acquired more confidence and a better self-concept; had a more positive attitude and were less impulsive. Students' comments during the debriefing interviews also indicated some positive changes in academic achievement, attitude and self-esteem. The great majority of the students felt that their academic performance had improved and they were unanimous in saying that they were better equipped to cope with school work. Half of the group indicated that they liked school and their teachers better than before and that they were empowered and felt better about themselves. Reports from the CBIS school after the initial project implementation indicated that the great majority of the CBIS students were still in school, were performing well academically and were demonstrating a positive

attitude toward school and school learning. The difference between the qualitative and quantitative data may suggest that the instruments used in this study were not sufficiently sensitive to detect small but important changes.

Forty per cent of the students in the control group also experienced changes in overall cognitive profile type. All these students moved from Type 2 to 1. Results showed important gain from pretest to posttest on all seven cognitive controls, sharpener: 48%; broad: 44%; analytical: 33%; focus: 19%; reflective: 11% and tolerance: 11%. Given that CBIS teachers also were implementing the augmentation and transfer training at the whole classroom level, these results are not surprising. The control group students benefited from the whole classroom instruction. Since these students have comparatively better developed learning skills, they are more likely to show important improvement with minimum assistance. This finding has important implications for the implementation of CBIS programs in the future. It appears that CBIS can be cost-effectively implemented at the whole classroom level and will yield positive changes in cognitive skills. This approach addresses the ecological issue raised when pulling students away from regular classroom settings. However, in the whole group instructional setting, students with already refined cognitive skills are likely to benefit more from CBIS training than those with skill deficiencies. Therefore, the one-to-one approach remains the strategy of choice for cognitive augmentation involving students with cognitive skill deficiencies. Students' comments confirmed that approach: "It helped me learned better" , "I understand more than in big classes" , "In the large class a teacher has difficulty in paying attention to individual students."

The great majority of teachers felt that CBIS had a significant impact on their beliefs about teaching and learning. As they worked with their students, they began to see things through a different window. They became more sensitive to students' needs which led to changes in their beliefs about teaching and learning. Changes in belief about teaching and learning are exemplified by comments such as: "I feel completely revitalized."; or "I am struck by how much assumption there is in teaching, how global we are in our content, and how little time and consideration are given to the students and what we are asking them to do"; or "I will never be able to teach the same way again." Some teachers indicated that they have learned to adapt their program to the individual needs of students. The CBIS project has led teachers to question their old beliefs and assumptions about teaching and learning and to embrace the cognitive-based paradigm. As they experienced this transformation they realized that teachers who only concentrate on teaching content fall short and that successful teachers teach and infuse learning how to learn skills into their teaching. They also gain more confidence in their professional action: "never have I felt so sure that some of the decisions I am making are sound and valid and with all my educational training I was never, before this time in my career, able to say that with as much confidence."

Teachers' comments indicated that they had no conceptual basis for helping students with learning difficulties and cognitive skill deficiencies before their participation in the CBIS project. They felt that CBIS gave them a framework and the necessary tools to help these students. At least nine teachers indicated that the CBIS program helped them to change their philosophy and their teaching strategies. One

teacher noted "you cannot assume kids have a certain knowledge . . . I now engineer for the cognitive skills and I do a cognitive analysis before I develop content." Another teacher also noted he was short on knowledge of learning how to learn and the CBIS training has helped him to fill that skill-gap. In today's super-symbolic economy (Toffler, A. & Toffler, H. 1995), those who have the skill to learn will be best equipped to capitalize on such an environment. While there have been several recommendations for teaching learning how to learn, few attempts have been made to explain how this can be done. The CBIS program provides such a model and teachers' comments confirm that claim: "It works! It is fascinating"; "I am sold on CBIS" and " I'll start each future course by teaching how to process information." Students' comments also indicate the power of the CBIS for teaching learning how to learn: "It helped me to learn better"; "difficult subjects, like math, became easier"; "I feel much smarter"; "I understand better"; "it became easier"; "I have more control"; "I do work a lot faster"; "we have better tool to tackle the work"; "it helps you a lot on tests"; "it improves my thinking"; "it's easier to do the work"; "I feel special"; "I learn better"; "we learned learning skills"; and "it pulled my marks up."

Teachers were to assess the CBIS training received and to make suggestions for improvement. They were unanimous in saying that CBIS training need some elements of demonstration, modelling and feedback. It appears that the cognitive apprenticeship model which includes elements of modelling, coaching, scaffolding, articulation, reflection and exploration will provide an appropriate framework for structuring and delivering CBIS training to teachers.

Teachers and parents agreed that cognitive augmentation and transfer training should occur earlier in the educational system and as.early as Grade 1. Parents were disappointed that the CBIS program arrived so late in their children's school career: " the children have had problems all along, but nobody had ever done anything". They felt that the program should have been there from Year One. This assessment made by parents corroborates with the study of the CBIS student' academic history. Some of these students did not meet the school readiness criteria when they were admitted to school in kindergarten and they have carried their deficiencies from grade to grade. The Prosperity Secretariat (1992,c) has recently argued that: "environmentally 'at-risk' families have a much lower ability than do other families to invest in their children in a large variety of ways that affect child development and learning readiness." (p. vi). The Secretariat further noted that children from these families are " highly vulnerable a lack of school readiness and ultimately, to school failure" (p. vi) and that appropriate intervention should be implemented to assist these children to be ready for school. This finding suggests that CBIS training should be provided at the elementary school.

Analysis of teachers' writing revealed five key ingredients that seemed to be necessary for the successful implementation of the CBIS program, namely: belief and commitment, hard work, support of colleagues, flexibility and openness to changes in beliefs about teaching, and learning. These conditions are also necessary to fully express the CBIS program to achieve significant learning gains.

During the debriefing interview all CBIS students indicated that their intent to finish high school. Two and a half years later, only 9.9% of these at-risk students had

dropped out of school. To the extent that the focus of this project was on dropout prevention, its objective has been accomplished. Although this project aimed at addressing the problem of school dropouts, it has by default addressed a major educational problem in our society. As Mr. Richard Coutts, Program Director, HRDC, puts it: the problem of students who attend school every day but are not getting anywhere -- those who have not dropped out of school physically, but psychologically, dropped out of all school learning.

RECOMMENDATIONS

The finding of this demonstration project lead the project staff to make the following recommendations.

1. CBIS model should be used as a framework for teaching learning how to learn.
2. CBIS augmentation and transfer training should start at the elementary school level.
3. CBIS augmentation and transfer training should be delivered in two formats: (1) whole classroom approach to enhance the learning skills of all students; and (2) clinical approach to augment students' cognitive skill deficiency.
4. The Cognitive Apprenticeship model should be used for training teachers in cognitive augmentation.
5. Teachers should be involved in all attempts to implement CBIS in schools in order to ensure sustainable school improvement efforts. Volunteers and retired

teachers should also be trained to implement CBIS programs in order to offset high cost of program implementation.

6. Teachers should be given ample time to practice their skills in cognitive augmentation before working with students.
7. When teachers are involved in clinical cognitive augmentation, they should be released from a portion of their regular teaching load.
8. Both qualitative and quantitative measures should be used to assess the effectiveness of the CBIS program.
9. Research and development should be carried out on the CBIS instrument validity and reliability.
10. Research and development work should be carried out to determine the relative importance of the seven cognitive controls for success in school learning. This research program should also investigate the sequence in which augmentation of these seven should be carried out.
11. Cognitive augmentation training should focus on skill areas where the potential for improvement is greatest. The augmentation program should also focus in areas with the largest cognitive skill deficiencies.
12. The Successful implementation of CBIS requires dedicated, committed, hardworking, flexible teachers who are also willing to alter their beliefs about teaching and learning.
13. Adequate funding should be provided for CBIS program implementation.

14. More grade level specific materials should be provided to teachers for the cognitive augmentation training.

15. Research should be carried out to determine the most appropriate way to schedule the augmentation on the seven cognitive skills.

16. To facilitate exchange of ideas and sharing of materials and information at least two to three teachers should be involved in the implementation of the CBIS program in any given school. Other teachers in the schools should familiarize themselves with CBIS and be supportive of CBIS teachers and students. School administrators should also develop a regional network of CBIS teachers to facilitate the exchange of information.

17. The impact of pulling students away from the regular classroom for the augmentation and transfer strategies should be investigated.

18. In the stage immediately following their CBIS training, teachers should not be required to work with more than one or two students in a clinical setting.

19. Teachers being trained for the implementation of the CBIS program at the whole classroom level should also be exposed to the clinical approach so they can develop a better grounding in the theoretical principles supporting the application of the CBIS.

20. The evaluation of the effectiveness of the CBIS should be designed to partial out any confounding effect of teacher training, teacher competence, time and resource allocation.

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APPENDIX A: Summary Tables for Statistical Analysis

Table 1

Cognitive Profile Complex: Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	18.33	18.33	1.43	.24
	70	895.10	12.79		

Table 2

Cognitive Profile Complex: Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	12.91	12.91	2.31	.13
Group * Time	1	39.75	39.75	7.11	.01**
Error	70	895.10	12.79		

Table 3

Cognitive Profile Complex: Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	4.90	4.90	.82	.37
Error	44	262.60	5.97		
Control					
Time	1	39.19	39.19	7.91	.01**
Error	26	126.82	4.95		

Table 4

Cognitive Profile Analytical: Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	100.10	100.10	5.98	.02**
	70	1172.22	16.75		

Table 5

Cognitive Profile Analytical: Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	183.17	183.17	38.07	.0001
Group * Time	1	2.89	2.89	.60	.4410
Error	70	336.77	4.81		

Table 6

Cognitive Profile Analytical: Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	154.71	154.71	30.49	.0001**
Error	44	223.29	5.07		
Control					
Time	1	56.02	56.02	12.83	.001*
Error	26	113.48	4.37		

Table 7

Cognitive Profile Reflective: Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	146.75	146.75	4.00	.05*
	70	2570.08	36.72		

Table 8

Cognitive Profile Reflective: Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	49.20	49.20	3.03	.09
Group * Time	1	2.67	2.67	.16	.69
Error	70	1139.55	16.24		

Table 9

Cognitive Profile Reflective: Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	49.88	49.88	2.55	.18
Error	44	860.62	19.56		
Control					
Time	1	11.57	11.57	1.09	.31
Error	26	275.93	10.61		

Table 10

Cognitive Profile Focus: Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	244.02	244.02	10.80	.0016**
	70	1581.73	22.60		

Table 11

Cognitive Profile Focus: Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	41.39	41.39	1.73	.19
Group * Time	1	4.72	4.72	.20	.66
Error	70	1671.77	23.88		

Table 12

Cognitive Profile Focus: Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	12.10	12.10	0.37	.5465
Error	44	1441.40	32.76		
Control					
Time	1	29.63	29.63	3.34	.09
Error	26	230.37	8.86		

Table 13

Cognitive Profile Narrow: Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	1026.63	1026.63	1.26	.26
	69	56150.97	813.78		

Table 14

Cognitive Profile Narrow: Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	738.13	738.13	2.21	.14
Group * Time	1	1358.98	1358.98	4.06	.05*
Error	69	23085.52	334.57		

Table 15

Cognitive Profile Narrow: Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	64.18	64.18	0.17	.69
Error	45	17056.82	387.66		
Control					
Time	1	1617.31	1617.31	6.71	.02*
Error	25	6028.69	241.15		

Table 16

Cognitive Profile Tolerance: Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	27.58	27.58	1.10	.30
	57	1432.89	25.14		

Table 17

Cognitive Profile Tolerance: Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	0.00	0.00	0.00	.99
Group * Time	1	28.17	28.17	1.46	.23
Error	57	1101.72	19.33		

Table 18

Cognitive Profile Tolerance: Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	24.53	24.53	0.99	.33
Error	41	1011.17	24.66		
Control					
Time	1	9.86	9.86	1.74	.21
Error	16	90.55	5.66		

Table 19

Self Esteem (Lie Scale): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	6.37	6.37	2.47	.12
	72	185.44	2.58		

Table 20

Self Esteem (Lie Scale): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	0.41	0.41	0.40	.53
Group * Time	1	0.01	0.01	0.01	.94
Error	72	73.56	1.02		

Table 21

Self Esteem (Lie Scale): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.30	0.30	0.25	.62
Error	41	48.20	1.18		
Control					
Time	1	0.14	0.14	0.17	.68
Error	31	25.36	0.82		

Table 22

Self Esteem (General Scale): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	11.10	11.10	1.52	.22
	72	527.17	7.32		

Table 23

Self Esteem (General Scale): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	0.20	0.20	0.09	.77
Group * Time	1	0.77	0.77	0.35	.56
Error	72	157.13	2.18		

Table 24

Self Esteem (General Scale): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.11	0.11	0.04	.84
Error	41	103.39	2.52		
Control					
Time	1	0.77	0.77	0.44	.51
Error	31	53.73	1.73		

Table 25

Self Esteem (Social Scale): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	0.72	0.72	0.34	.56
	72	150.23	2.09		

Table 26

Self Esteem (Social Scale): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	2.28	2.28	3.25	.08
Group * Time	1	0.88	0.88	1.25	.27
Error	72	50.67	0.70		

Table 27

Self Esteem (Social Scale): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.19	0.19	0.25	.62
Error	41	31.81	0.78		
Control					
Time	1	2.64	2.64	4.34	.05*
Error	31	18.86	0.61		

Table 28

Self Esteem (Academic Scale): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	23.98	23.98	8.68	.004
	72	199.00	2.76		

Table 29

Self Esteem (Academic Scale): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	0.41	0.41	0.44	.51
Group * Time	1	0.24	0.24	0.27	.27
Error	72	65.93	0.92		

Table 30

Self Esteem (Academic Scale): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.01	0.01	0.01	.92
Error	41	49.49	1.21		
Control					
Time	1	0.56	0.56	1.06	.31
Error	31	16.43	0.53		

Table 31

Self Esteem (Parental Scale): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	0.12	0.12	0.04	.84
	72	200.56	2.78		

Table 32

Self Esteem (Parental Scale): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	2.30	2.30	3.33	.07
Group * Time	1	0.14	0.14	0.20	.66
Error	72	49.68	0.69		

Table 33

Self Esteem (Parental Scale): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.76	0.76	1.34	.25
Error	41	23.24	0.57		
Control					
Time	1	1.56	1.56	1.83	.19
Error	31	26.44	0.85		

Table 34

Self Esteem (Overall Scale): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	88.68	88.68	2.59	.11
	72	2469.75	2469.75		

Table 35

Self Esteem (Overall Scale): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	0.04	0.04	0.00	.95
Group * Time	1	0.91	0.91	0.11	.75
Error	72	615.99	8.56		

Table 36

Self Esteem (Overall Scale): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.76	0.76	0.07	.79
Error	41	417.24	10.18		
Control					
Time	1	0.25	0.25	0.04	.85
Error	31	198.75	6.41		

Table 37

School Attitude Measure (Motivation): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	558.55	558.55	5.42	.02
	73	6523.23	103.06		

Table 38

School Attitude Measure (Motivation): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	124.52	124.52	6.20	.02*
Group * Time	1	0.20	0.20	0.01	.92
Error	73	1467.17	20.10		

Table 39

School Attitude Measure (Motivation): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	65.19	65.19	3.24	.08
Error	41	825.81	20.14		
Control					
Time	1	60.14	60.14	3.00	.09
Error	32	641.37	20.04		

Table 40

School Attitude Measure (Performance): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	1523.32	1523.32	10.99	.001*
	73	10115.72	138.57		

Table 41

School Attitude Measure (Performance): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	80.31	80.31	3.22	.08
Group * Time	1	0.09	0.09	0.00	.96
Error	73	1823.27	24.98		

Table 42

School Attitude Measure (Performance): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	48.76	48.76	1.82	.18
Error	41	1101.24	26.86		
Control					
Time	1	33.47	33.47	1.48	.23
Error	32	722.03	22.56		

Table 43

School Attitude Measure (Reference): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	739.83	739.83	6.42	.01*
	73	8410.27	115.21		

Table 44

School Attitude Measure (Reference): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	133.79	133.79	5.78	.02*
Group * Time	1	0.77	0.77	0.03	.86
Error	73	18689.98	23.15		

Table 45

School Attitude Measure (Reference): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	88.05	88.05	3.87	.06
Error	41	932.95	22.76		
Control					
Time	1	350.97	50.97	2.15	.15
Error	32	757.03	23.66		

Table 46

School Attitude Measure (Sense of control): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	957.50	957.50	12.78	.0006*
	73	5470.48	74.94		

Table 47

School Attitude Measure (Sense of control): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	10.95	10.95	0.49	.49
Group * Time	1	21.27	21.27	0.96	.33
Error	73	1625.02	22.26		

Table 48

School Attitude Measure (Sense of control): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	0.96	0.96	0.05	.83
Error	41	854.54	20.84		
Control					
Time	1	28.02	28.02	1.16	.29
Error	32	770.49	24.08		

Table 49

School Attitude Measure (Instructional Mastery): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	487.27	487.27	4.68	.03*
	73	7601.06	104.12		

Table 50

School Attitude Measure (Instructional Mastery): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	145.45	145.45	5.90	.02*
Group * Time	1	0.68	0.68	0.03	.87
Error	73	1798.33	24.63		

Table 51

School Attitude Measure (Instructional Mastery): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	94.30	94.30	3.94	.05*
Error	41	981.20	23.93		
Control					
Time	1	56.38	56.38	2.21	.15
Error	32	817.12	25.54		

Table 52

Canadian Tests of Basic Skills (Math, Raw Score): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	2075.25	2075.25	32.51	.0001**
Error	77	4914.93	63.83		

Table 53

Canadian Tests of Basic Skills (Math, Raw Score): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	328.55	328.55	28.39	.0001**
Group * Time	1	116.55	116.55	10.07	.002**
Error	77	891.17	11.57		

Table 54

Canadian Tests of Basic Skills (Math, Raw Score): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	31.21	31.21	2.86	.10
Error	44	480.29	10.92		
Control					
Time	1	367.12	367.12	29.49	.0001**
Error	28	410.88	12.45		

Table 55

Canadian Tests of Basic Skills (Reading, Raw Score): Repeated Measures ANOVA Summary Tables for Between Subject's Effect.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Group	1	2168.43	2168.43	15.29	.0002**
Error	71	10071.94	141.86		

Table 56

Canadian Tests of Basic Skills (Reading, Raw Score): Repeated Measures ANOVA Summary Tables for Time and Time * Group Interaction.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Time	1	596.66	596.66	30.17	.0001**
Group * Time	1	135.97	135.97	6.87	.01**
Error	71	1404.29	19.78		

Table 57

Canadian Tests of Basic Skills (Reading, Raw Score): Repeated Measures ANOVA Summary Tables for Within Subjects Effects.

Source of Variation	df	Sum of Squares	Mean Square	F	p
Treatment					
Time	1	102.56	102.56	4.81	.03**
Error	43	2916.94	21.32		
Control					
Time	1	540.16	540.16	31.03	.0001**
Error	28	487.35	17.41		

APPENDIX B: CBIS debriefing Questionnaires

CBIS PROJECT
DEBRIEFING

DEBRIEFING QUESTIONS FOR TEACHERS, PRINCIPALS AND STUDENTS

A. QUESTIONS FOR TEACHERS.

1. Do you feel confident now in using CBIS strategies?

2. Has the use of CBIS changed your philosophy of teaching and learning? In what way?

3. Has the use of CBIS changed your teaching strategies?
   a. in the way you design and present instruction?
   b. in the way you assess learning outcomes?
   c. do you plan to incorporate these changes in your future teaching?

4. Has the use of CBIS, as far as you can see, brought about changes in:
   a. students' self concept?
   b. students' behaviour?
   c. students' academic achievement (higher grades) ?
   d. students' attendance?
   e. students' attitudes (towards school subjects, peers, teachers)?
   f. students' learning strategies?
   g. students' participation in school activities? (curricular and extra curricular)?
   h. students' response in general?

   Have you received any feedback from parents with regard to the above? If so, what were their comments?

   I. your working relationship with other teachers and the principal(s)?

5. What is your opinion about the CBIS project and the training you received?
   a. the workshops led by Charles Letteri
   b. the video material

c. the facilities
d. the on-site coaching
e. how much did you learn?
f. are the outcomes worthwhile?
g. were there any unintended outcomes?
h. what are the two most positive aspects of CBIS?
I. what are the two most negative aspects of CBIS?

6. There are seven cognitive profile levels.
   a. How many levels did your students cover?
   b. Are you confident in the augmentation and transferring abilities of your students in each of the seven domains?

7. What is your perception of:
   a. the computer cognitive profile test?
   b. the augmentation material (the handbooks)?

8. Do you think CBIS training should be a required component of pre-service teacher education? Why? Why not?

9. For your participation in this project you received six credits at the Faculty of Education. Was this an incentive?

10. Is it a good idea to have the Faculty of Education do this type of project in the schools?

11. Do you have any other comments?

B. QUESTIONS FOR PRINCIPALS

1. Do you feel that your school's participation in the CBIS project has been beneficial to:
   a. the at-risk students involved (academically and non-academically)? Please comment on the fact that students were pulled out of the classroom.
   b. the teachers involved?
   c. the entire school (teachers and students)?

2. Do you think that the CBIS project has been successfully implemented?

a. if yes, what were the positive aspects?
b. if no, what were the problems?

3. Do you feel that the CBIS project rated:
a. full administrative support? Was it given?
b. full support of the entire staff? Was it given?

4. Did the CBIS project improve relationships between teachers in the project and their colleagues?
a. if yes, in what manner?
b. if no, what were the problems?
c. or was there no change?

5. Did you receive any feedback from parents? If so, of what nature?

6. What are your feelings about this kind of collaboration with the Faculty of Education? Did it increase mutual trust? Should they continue this type of work?

7. How would you describe and characterize:
a. your school's population?
b. your school's philosophy and culture?

8. Do you have any other comments?

C. QUESTIONS FOR STUDENTS

1. How did you feel to be pulled out of the classroom? Do you think you missed or gained by it?

2. How did you feel about the one to one or the small group sessions with your teacher?

3. Did your participation in this project change your attitude towards: a. school (finishing high school)?
b. teachers?

4. Do you feel that your academic performance has improved?

5. Do you feel that you have more control now over what

you learn and how you learn it? Are you coping better with your school work?

6. How do you feel about yourself, after your participation in this project?

7. What did you like most about this project? What did you like least about it?

8. Do you have any other comments?

D. QUESTIONS FOR STUDENT TEACHERS

1. What are, according to you the merits of the CBIS project? What are its faults?

2. Did your participation in this project have an impact on:
   a. your own preparation as a teacher?
   b. your career plans?

3. Did your participation in this project have any impact on your relationship with your cooperating teacher?

4. Do you have any other comments?